Pit and Quarry

SAND ▪ GRAVEL ▪ STONE

HANDLING ▪ CRUSHING ▪ SCREENING ▪ WASHING

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ROCK WAUGH DRILLS

The Distinguished Service Mark

Distinguished among quarrymen the world over because they know the "Waugh" sign on a rock drill means easier, faster, harder-hitting, less expensive, and better drilling, happier drill-runners and increased production

For fast one-man work you'll want the "Clipper"—for heavier work, the "Dreadnaught." Write for our "P.&Q." bulletins.

THE Denver Rock Drill Mfg. Co.
Denver, Colorado

SEPTEMBER, 1919

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Bagging Talks

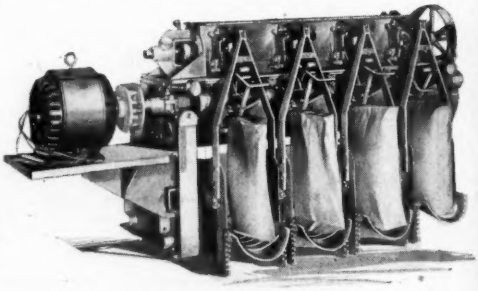
No. 7 HOW TO GET ACCURATE WEIGHTS

50 lbs. net—and no guesswork!

In these times of close figuring and keen competition, guesswork won't do. Accurate weights to customers are just as essential to successful business as definite prices.

The Urschel-Bates Packer

has an automatic weighing device that **absolutely eliminates chance.** The "Packer" fills rapidly and weighs accurately, and discharges a neat self-sealed package.



Goods that are packed by The Urschel-Bates Packer in Bates Valve Bags are accepted at face weights.

THE URSCHEL-BATES VALVE BAG CO.

TOLEDO, OHIO

This is number seven of a series. Watch for the others.

U. S. GEOLOGICAL SURVEY
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Pit and Quarry

Vol. 3 Chicago, Ill., September, 1919 No. 12

It's a Good Craft, But Don't Forget the Life Preserver

Loaded to Full Capacity?

IN making requests for cars, the applicant, or the association which may happen to represent him, must be ready to answer this question: "Does the applicant make a practice of loading his equipment to the full capacity?"

If you can answer this question satisfactorily, well and good; you will stand as good a show as anyone of getting any available cars.

But the Railroad Administration must be assured that you are shipping no dead car space around over its lines. And this position, in a time of severe shortage like the present, is absolutely justified. We have had many things to say against the Railroad Administration, and shall doubtless have more; but it is entitled to this much co-operation at least.

Box Cars!

OF course you know that it is not an unheard-of practice to ship pit and quarry products in box cars.

True, the suggestion may not be particularly timely right now, when box cars are about as scarce as those of the open-top variety; but there may be localities where box cars can be more readily obtained, and the traffic

diverted to them for the time being.

One operator told us the other day that he has actually been receiving requests recently to have gravel shipped in box cars, as they are so much easier to unload. And the way the unloading is accomplished in many cases is by means of a drag scraper, with a horse and cable attached, getting easily back into the ends of the car, and cleaning it out more quickly and with much fewer "hands" than by the ordinary means of emptying an open-top car.

Of course the box car does not hold as much, and you may not be fixed to load this class of carrier economically; but it is something worth thinking about.

Must Pay Tax on Gravel

Judge Rules That Only One-Third of Material Used on Galveston Causeway Is Not Taxable

A TAX will have to be paid the state of Texas on 67 per cent of the sand and gravel used in the Galveston County causeway, according to a decision handed down in Houston by Judge H. J. Dannenbaum of the sixty-first district court. Galveston County has asked for a permanent injunction restraining the game, fish and oyster commissioner from revoking the sand and gravel permit of causeway contractors for the nonpayment of taxes, on the ground that this would interrupt the construction of a public highway.

Judge Dannenbaum, according to Mr. Theobald, ruled that the lease of the causeway to the railroad companies and the fact that they were paying 67 per cent of the cost was in fact a sale, and that the railroads, therefore, owned the causeway to that extent, and, therefore, were not entitled to exemption from the tax. The county gave notice of appeal.

"While we lost one of the biggest points in the case," he said, "we at least gained the main object for which the injunction proceedings were instituted, which is that there will be no tieup in the construction of the causeway. The deputy game, fish and oyster commissioners stated that they would withhold the revocation of the permits of the subcontractors, Merrill & Merrill, until Saturday, when the tax will be paid. The county, of course, already has its own permit, and that is not affected by this decision. The subcontractors will pay this tax and pass the cost on to the main contractors, I suppose. If we win on the appeal of the case, the county will have to apply to the legislature for the amount of tax collected on 67 per cent of the sand used.

"As to the merits of the decision, I express no opinion. It may be right that the lease of the causeway for 999 years constitutes a sale, together with the fact that they are paying 67 per cent of the cost, but I know that it was never the intention to waive any of the county's rights in this matter. The higher courts will decide finally upon the question of ownership, and in the meantime the work will go forward uninterruptedly as the result of our efforts."

A MANAGER of two plants recently stated that the only routine duty he has in connection with the business is to sign the checks. And that's enough. If more men would get out from under the burden of routine which is distracting their attention from bigger things, and would devote their whole working time to the job of thinking, planning, selling, forging ahead, they would get farther in the business world.

Demurrage Unfair on Unbilled Loads

Stone Urges That Pit and Quarry Products Be Treated Same As Coal in This Respect

IN a letter recently addressed to Chas. Rippen, chairman of the demurrage committee of the National Industrial Traffic League, Ben Stone of the Illinois Sand and Gravel Producers Association explains why demurrage should not be assessed against unbilled shipments. He says:

"It is not so much the actual amount paid for demurrage by sand and gravel shippers that constitutes the burden; but rather the loss of production which results under the present rules from necessity of avoiding demurrage on unbilled loads. In other words, the average margin of profit to the producers of sand and gravel is so thin that it takes only a few days demurrage to wipe it out.

"Our deposits do not run regularly, and daily production cannot be governed by orders as to various grades or sizes, but must be taken as it comes. For instance, a given plant having a daily capacity of 27 cars, has orders on file for 18 cars of gravel and 9 cars of sand; but the production on that day turns out 9 cars of gravel and 18 cars of sand, which ratio is very common. Being faced with a penalty for demurrage, the surplus sand must be wasted back or run into the storage pile, and in either case must be rehandled at some future time and at increased cost. Adequate storage facilities also entail additional overhead expenses.

"This is practically the same condition which the exemption of demurrage on unbilled coal is intended to alleviate. Right now, the coal mines are piling up screenings and incidently are tying up a great deal of equipment. On August 1st there were 1,480 cars of unbilled coal in the Central Illinois mining district. All indications are that there will be a steady increase of unbilled coal from day to day for the next sixty days at least. At other seasons of the year, when there is a strong demand for steam and little demand for prepared sizes, the unbilled coal consists of nut, egg, and lump.

"I would not have you understand that producers of sand and gravel desire exemption from demurrage on unbilled cars in order to use the cars indiscriminately for storage. Here again the small margin on which our industry is conducted enters, and makes it imperative that our materials move to market with as little delay as possible. Small profits, as you know, require quick turnovers.

"Sand and gravel are commodities that can no longer be regarded by the carriers as tramp traffic to be handled at will or convenience. In order to produce and prepare these materials to meet specifications laid down by engineers and architects, heavy investments in plants and equipment are necessary, and highly skilled mechanics are required. The natural result is that the intrinsic value of these commodities has greatly increased and they are now moving over a much wider area than ever before. They must be recognized as real basic materials and treated as such.

"It is our opinion that the demurrage rule providing exemption on empty cars placed for loading and unbilled loads held for disposition is unduly preferential to the coal industry, and we hope to have this unfair discrimination removed."

Fundamentals in Choosing Plant

By Daniel J. Hauer

THE selection of plant for a quarry must start in developing the ledge. Plant in a quarry is used for a great variety of work: Stripping the ledge, disposing of the spoil, drilling, blasting, picking up the quarry product, transporting it, and the handling and working of the product in the mill or plant. Then equipment and machinery may have to be used for handling the finished product, loading and shipping it.

The first consideration is what machine methods should be used, and if it is good practice to do some things by hand. Many of the so-called practical men always claim that many operations, especially those that may not have to be done continually, can be done cheaper by hand than by machines. During the past month the writer has had an experience of this kind. Some crushed stone has had to be rehandled. Some weeks little if any is handled, while during other weeks from 200 to 500 tons must be rehandled. It was the writer's intention to handle this by machinery, but a practical man decided he could do it very cheaply by hand, with the result that it has been done by the slow method at a high cost, which has been added to by expensive waits of wagons and auto-trucks, while many dollars have been spent in demurrage on cars. Then too it has been difficult to hold men at the monotonous grinding work, and all of these things have affected other operations that had to be done.

The following is excellent advice and can almost be considered as an axiom: "A man should never do the work that a machine can do for him." As a rule machines can do work cheaper than men, but even when this is not true it is advisable to use machines instead of hand methods, as time may be saved, or the work may be done better, and always it means that fewer men need be employed.

This principle applies to almost every operation in quarry work, yet many quarrymen ignore this fact and do much shoveling that can be done by machines, hoist things that should be raised by derricks or blocks suspended from beams or cranes, do hand drilling instead of using machines, and so on through a long list.

With plant to be purchased, it is all-important that the proper selection be made. First, shall it be new machinery or second-hand? Some business men will only purchase new machines, while some go to the other extreme and buy only used machinery. There is much to be said on both sides. In one case a quarryman purchases only second-hand machines. The result is that his plant is made up of a large number of misfit units. Some of the machines are of such old make that they are obsolete, and the only way to get a new part is to have it made by a local machine shop. Pipes, which are also second-hand, are continually leaking. Bearings are so old that it is difficult to keep them true. The appearance of this plant is always so poor that many competitors call it a junk shop.

But it is evident that some second-hand machines are real bargains. A crusher of modern pattern may be but a year old and but little used, yet for some good reason is placed upon the market and sold for little

more than half of its original price. Anyone needing a crusher of that type and size would be foolish to buy a new one if he can purchase such a used machine. The same thing may be true of a boiler or a pump. The large pumps for one of the most successful quarry sluicing plants in the east were purchased second hand.

To buy used machinery the buyer should possess knowledge of either manufacturing or operating machines. If the seller will not guarantee the machine, which is seldom done, then more than an outside inspection should be made. The machine should be taken apart so that its actual condition can be seen. The cost of this may be slight as compared to the price paid for a worn-out machine.

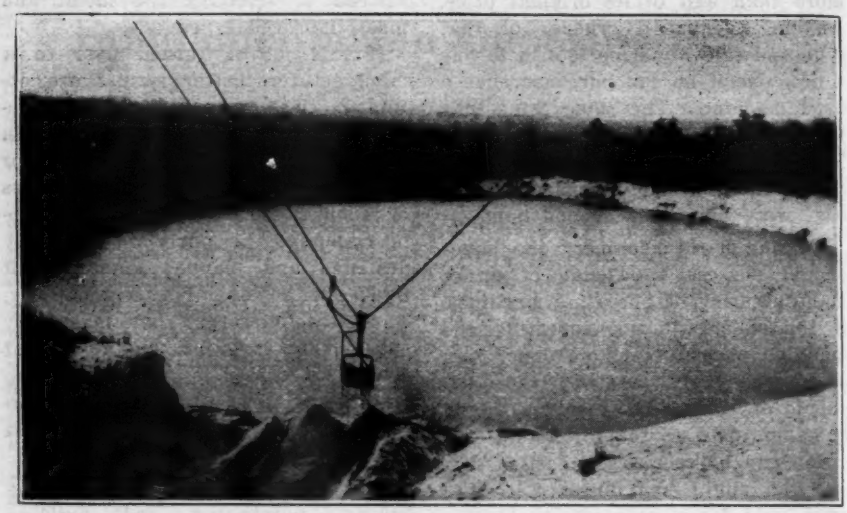
There are three ways of purchasing a quarry plant. One is for the quarryman to select his own machines and make up his own layout or plans. A second is to turn over the matter to a manufacturer, specifying the general conditions to be met. The manufacturer will then get up the plan and install the plant. A third method is to employ an engineer or quarry expert and allow him to make the plans and recommendations and then purchase and install the plant according to his plans.

The first method of selecting plant is the most common, and there are many features in connection with it that can be objectionable. Good salesmen may be able to influence the purchaser to buy a machine which is not the one best suited for the work or to go with the rest of the plant. Then, too, the selection of the plant is likely to be from a limited knowledge of plant, as a busy operator is hardly able to keep posted on all the various types and makes of machines on the market. He is likely to buy machines he has used before instead of selecting the latest and most improved types.

If this job is turned over to a manufacturer, better results are obtained. The manufacturer will design a better balanced plant and in most ways a very complete layout for the operations. The future success of a business is wrapped up in the operation of the plant and a poorly designed and planned plant is not likely to be operated economically. The manufacturer of machinery should know how each unit of a plant should be located in reference to the others and how all should be operated to give the maximum output at the minimum cost.

The third manner of designing, selecting, purchasing and building quarry plants is to employ the services of an expert engineer. He will do, in the writer's opinion, the best work, for he will secure the co-operation of not only one but a number of manufacturers, and will bring his own expert knowledge to supervise the work of others. He is likely to select the best types and makes of machines and so install them that the cost of operation will be low. He not only has his reputation at stake but he must render real service at a reasonable cost to have quarrymen employ him. He has nothing to sell but his services, so is not unduly influenced in selecting machinery as a manufacturer may be in selling his own products.

In selecting an expert, care must be exercised in getting one of experience and with adequate plant knowledge. It should be his business to make up not only a general plan and layout, but detailed working drawings, and plans for future developments and additions, for many quarry plants are built with no provision being made for the plant to be enlarged.



Pit of Willard Sand & Gravel Co., Farmingdale, L. I.

Cableway Covers Large Area

Bridle Hitch Enables It to Excavate Big Yardage Without Moving

OPERATIONS at the plant of the Willard Sand & Gravel Company Farmingdale, Long Island, New York, afford interesting data showing the wide area that can be excavated by a dragline cableway excavator at one setting.

The 600-foot span one-yard Sauerman dragline cableway excavator employed at this plant has excavated over 200,000 cubic yards of sand and gravel without any change in the position of the machine except the slight shifting permitted by the 150-foot bridle hitch at the tail end of the cableway.

The pond which it has excavated is about 400 feet long, 250 feet wide, and 45 feet deep at present and getting wider every day.

Daily Report of Quarry Operation

Milwaukee Company Gets All the Dope Each Morning for the Preceding Day

THE report blank shown on the opposite page is the one in successful use by the Lake Shore Stone Company of Milwaukee.

This company operates two quarries in two different locations, and the two are slightly different, due to some difference in the product, but are practically as shown.

The report blank is mailed to the office by the superintendent each evening, and shows the office just what has been accomplished together with the cost of operation for the day.

Agaraw Sand & King Co., Paterson, N. J., has been incorporated by George L. Weber of Hawthorne, Thomas Hametman, of Paterson. Capitalized at $25,000.

Lake Shore Stone Company

Daily Report

Stone Haven, Wis.....191..

OPERATING EXPENSES

LABOR

Quarrying .....
Stripping .....
Blasting .....
Drilling .....
Crushing .....
Loading .....
POWER—Engines and Pumps.....
Handling Coal.....
Farm .....
Office .....
Sand .....

REPAIRS—Tools .....
Engines and Boilers.....
Tracks and Cars.....
Cable Railway.....
Crusher .....
Cribs and Bridges.....
Buildings .....
Drills .....
Pumps .....

Total Labor—Production.....

MATERIALS USED

Lbs. Dynamite.....
Lbs. Black Powder.....
Exploders .....
Ft. Fuse.....
Caps .....
Lbs. Coal.....
Cylinder Oil—Quartz.....
Engine Oil, " .....
Crusher Oil, " .....
Compressor Oil " .....
Illuminating Oil, " .....
Cable Coating, " .....
Grease—Lbs. .....
Total Materials Used.....
Total Labor.....
Total Cost of Production.....

CONSTRUCTION

Buildings .....
Cribs and Bridges.....
Tracks and Cars.....
Engines and Boilers.....
Bins and Spouts.....

Total Construction.....

SUMMARY

Total Labor Production.....
For'd from previous report.....
Total Labor production to date.....
Materials used.....
Fr'd from previous report.....
Total materials used to date.....
Total cost of production to date.....

Construction .....
For'd from previous report.....
Total cost of Construction to date.....

.....*Men Employed, A. M*.....
..... " " *P. M*.....

GENERAL INFORMATION

Crusher ran....hours—Yards Crushed.....
Total Yards Crushed Last Report.....
" " " *to Date*.....

...Drills in operation—No. feet drilled....
Hennepin .....

Weather .....

CABLE CARS

Yds. shipped today.....
" " *last report*.....*Flux*
" " *to date*.....

—*2½ inch*
—*1½ inch*
—*½ inch*
—*Sand*
—*Total*

Respectfully submitted,

.....

Supt.

Increased Production Is Greatest Need

This Will Help to Lower Abnormal Prices Caused by Wage Increases

A NEW menace is looming up before the building material consumer, says the Dow Service Daily Building Reports of New York. He realizes that greater production alone will quickest bring lower prices. But before there can be greater production there must be more labor saving machinery, better and more adequate transportation and handling facilities. Abnormal trading in the stock exchanges of late shows that industrials representing factors making for lower construction costs have not been the favorites. With the country still forty-six per cent under constructed and New York still short a third of the number of structures it now actually needs, industrials normally would attract a heavy part of these investment funds when the Wall street bubble breaks. Building materials stands high in the list of such industries.

But with the further unsettling of these industries by allegations disturbing to confidence and requiring many years before actions can be brought to a deciding conclusion, building material interests who, during the war, submitted their costs to the federal War Industries and similar boards, believe that great barriers are being raised against alleviating the housing and commercial space shortage at the quickest possible moment by falsely giving the impression to prospective builders that prices are going to fall and that they would do well to wait for lower levels.

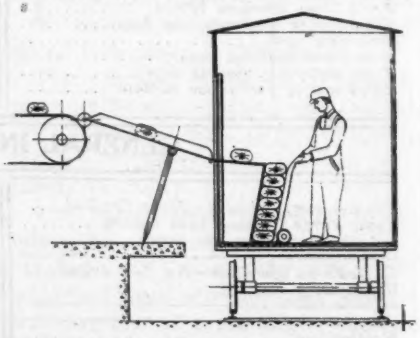
Building material prices are high today mainly because labor has been granted almost every increase it has asked for since this country went to war. The element of supply and demand has hardly appeared in price fluctuations. In fact many mills have been hungry for business up to the present time. When the country's building movement gets fairly under way and the capacity of the country's building material producing plants becomes fairly absorbed, even at the 40 to 60 per cent of capacity at which they will be able to operate because of unskilled labor dearth, new costs must be added to the materials put into new or altered buildings even above those now represented by the higher cost of skilled labor.

From Belt to Truck

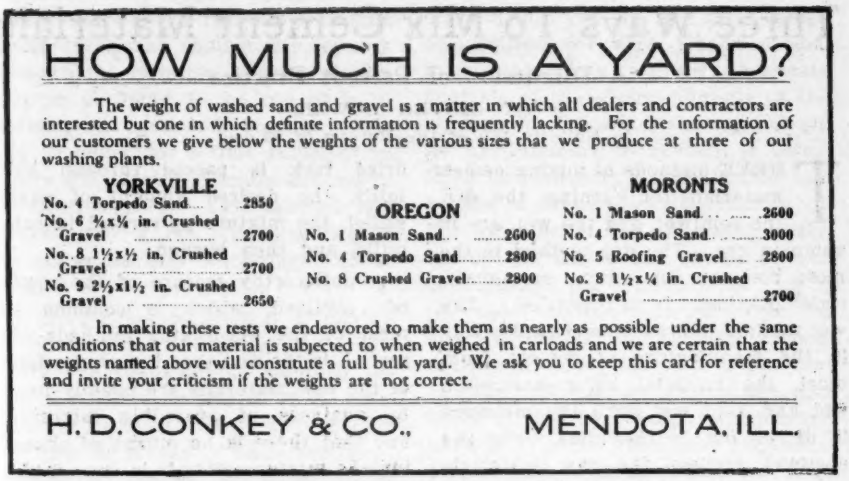
In many cement and lime plants the filled sacks are taken from the Bates valve bagging machine and placed on a belt conveyor for delivery as desired.

If cars are on the track ready to be loaded, the bags can be delivered directly cnto a truck inside the car, as shown in the illustration.

The conveyor belt runs at a speed of 200 feet per minute, and the small



live roller at the head of slide has a peripheral speed of 250 feet per minute, giving the bags sufficient momentum to send them down the slide onto the horizontal landing table, from which the trucker guides them onto the truck.



HOW MUCH IS A YARD?

The weight of washed sand and gravel is a matter in which all dealers and contractors are interested but one in which definite information is frequently lacking. For the information of our customers we give below the weights of the various sizes that we produce at three of our washing plants.

YORKVILLE

No. 4 Torpedo Sand	2850
No. 6 ¼x¼ in. Crushed Gravel	2700
No. 8 1½x½ in. Crushed Gravel	2700
No. 9 2½x1½ in. Crushed Gravel	2650

OREGON

No. 1 Mason Sand	2600
No. 4 Torpedo Sand	2800
No. 8 Crushed Gravel	2800

MORONTS

No. 1 Mason Sand	2600
No. 4 Torpedo Sand	3000
No. 5 Roofing Gravel	2800
No. 8 1½x¼ in. Crushed Gravel	2700

In making these tests we endeavored to make them as nearly as possible under the same conditions that our material is subjected to when weighed in carloads and we are certain that the weights named above will constitute a full bulk yard. We ask you to keep this card for reference and invite your criticism if the weights are not correct.

H. D. CONKEY & CO., MENDOTA, ILL.

Card Sent Out by Gravel Producer Giving Weights

What's Weight of a Yard of Gravel?

This Company Gives Actual Figures for the product of Its Various Plants

ARBITRARY figures on the weight of pit and quarry products are a delusion and a snare, according to W. G. Van Etten, of H. G. Conkey & Company, producers of washed sand and gravel, Mendota, Ill.

So his company has devised the card shown above, to send out to the trade.

"One of the hardest things that we have to contend with in certain territory where crushed stone is sold," says Mr. Van Etten, "is to get the trade to figure any different weight than 3,000 pounds for gravel and 2,500 pounds for stone.

"Probably the fault of this lies with the gravel producer, as too often he has been content to use this method of figuring and has made no effort to change it; in fact, we do not believe that all producers of gravel actually know what their material weighs.

"With this in mind we have prepared a table, showing the weights on material at three of our pits. This table shows that our washed gravel does not weigh much more per yard than a good quality of limestone, and when the fact is taken into consideration that because the voidage in limestone is greater than that in gravel, more sand is required, one can readily see that the old basis of figuring 3,000 pounds of gravel and 2,500 pounds of stone is manifestly unfair to the gravel producer.

"We believe that this is something every producer of sand and gravel should look into and should advise his trade the weights of the various sizes that he produces."

The Glen Falls Portland Cement Company, Glens Falls, N. Y., has broken ground for a modern one-story office building. The basement will extend above the ground and the laboratory will be located in that part of the building.

L. A. Yocum and others have organized the Blue Knob Crushed Stone Company, of Wooster, Ohio. Capital stock, $10,000.

Three Ways To Mix Cement Materials

A Discussion of Present Practice

BY OLIVER BOWLES

in Bulletin 160 of the Bureau of Mines

THREE methods of mixing cement materials for burning, the dry, the semiwet, and the wet, are in common use. The dry method is the most common for mixing raw materials obtained from quarries. The wet method is used almost exclusively in the manufacture of cement from marl, the material being excavated wet and kept wet until the moisture is driven out in the kilns. For the semiwet process the raw materials are at first in a dry state, but at some stage water is added, the subsequent steps being similar to those of the wet process.

Dry Processes

Some typical examples of dry methods may be briefly outlined. In one plant the limestone is crushed in a No. 8 gyratory crusher, and all fragments larger than 2-inch are recrushed in a No. 5 crusher. The rock is dried and then passed through a ball mill, after which clay is added. The clay is ground, dried, and added to the limestone in the desired proportion by weight. The resulting mixture is pulverized in Fuller mills. It is sampled every hour, and the proportion of clay needed is calculated from analyses of the samples.

At another plant observed, the crushed rock is conveyed to a storage bin, after which it is passed through driers and then through hammer mills. Shale is added and the mixture is pulverized in Fuller mills and is then ready for burning. As before, analyses of the mixture are made every hour.

At a third plant, the crushed and dried rock is passed through ball mills, the desired amount of shale added, the mixture pulverized in tube mills, and then burned.

A noteworthy feature of the methods outlined, which is common to most of the dry-mixing methods observed, is the fact that the proportions of the raw materials are usually fixed by analyses of preceding mixtures, and that there is no means of changing the mixture after it is once made, except insofar as a change in subsequent mixtures may affect it. In other words, one mixture is analyzed, and as a result of this analysis a change is made in a subsequent mixture, which may or may not need the change. If the raw materials are subject to only slight fluctuations in composition, the method gives satisfactory results, but if marked changes in composition occur an undesirable mixture is likely to result. The selective, hand-loading method of quarrying is the direct outchemist to cope with marked fluctuations in composition of the raw materials. In some plants, mixing has become a process of almost pure guesswork. The chemist becomes very familiar with the rock, judges its composition with fair accuracy from its appearance, and regulates the mixture on the basis of this judgment. Needless to say, the method demands constant vigilance and careful quarry supervision.

Methods of Overcoming Fluctuations

One fairly effective method of meeting the difficulty is to run the mixed and pulverized material into a large storage bin before it enters

the kilns. If a supply sufficient for eight or nine hours' run is maintained the operator may compensate for any undesirable variation. Thus, if the mixture is found to be too high in calcium, an excess of clay or shale may be added for a time sufficient to reduce the average calcium content to the desired point. This method can succeed only where proper mixing of the materials may be brought about in the bin.

A more accurate method of mixing is followed by one Oklahoma plant where the limestone is sampled before the shale is added. The limestone is crushed, dried, and ground, and then by means of an intermittent sampler a sample is taken about every 65 seconds. All the samples for a given period of time are mixed, an average analysis obtained, and the proper proportion of shale calculated and added by weight. As clay stripping is shot down and loaded with the rock in the quarry, a small amount of shale only is added. The mixture is then pulverized in tube mills. The product of five tube mills is all conducted to a single bin, from which it is distributed to the kilns. Such mixing gives greater uniformity to the product.

The Best Methods Observed

An admirable method observed of making a dry mix is successfully used by a company in the Middle West. Blasting in churn-drill holes and steam-shovel loading are employed. A clay overburden of good quality is shot down and loaded with the rock, and on this account the addition of shale is unnecessary. The rock is crushed, dried, and ground in a ball mill to 14-mesh size. The ground material is then taken to storage bins, and during transit a continuous sampler takes a representative sample, which is analyzed every 3 hours. A record is kept of the rate of entry, the number of hours that rock is discharged into the bin, and the average composition for each 3-hour period. From this data a fairly accurate analysis of the entire contents of the bin may be deduced. The ratio of silica and alumina to calcium is calculated by Newberry's formula that carbonate of lime=silica$\times$5+alumina$\times$2. For example, if the estimated analysis of the entire bin shows 12 per cent silica, 7 per cent alumina, and 72 per cent calcium carbonate, the desired percentage of calcium carbonate would be 74. As only 72 per cent calcium carbonate is present, the contents of this bin would be expressed as —2. Twelve such bins are maintained, and each is designated by a plus or minus figure, which indicates the excess or shortage of calcium carbonate.

In drawing off the material it is taken from not less than three bins at once, and a combination of bins is selected such that the + and — quantities will give a zero result. The first run is sampled and its composition approved before the mixture is allowed to go to the tube mills for final grinding. This method has advantages over methods of mixing pure shale and limestone. In the latter methods temporary obstruction of the flow of shale or limestone decidedly affects the composition of the mixture, whereas with the method outlined, the contents of the various bins differ so little in composition that the effect of obstructing any one outlet for a brief period would be small. For plants where shale is mixed with limestone, it is, therefore, desirable to add the shale before the material enters the storage bins.

An improved type of bin, having for its object more complete mixing of the materials, was observed by the writer at an Illinois plant. Four bins are provided for storing rock after it is crushed, dried, and ground to 20

mesh. Each bin is divided into four parts by vertical partitions. The parts are filled in succession, but the material is drawn off from all four simultaneously. This tends to equalize any fluctuations in composition. Uniformity in the final mixture is further promoted by having sufficient storage room at the kilns for 3 or 4 hours' supply.

Another improvement suggested is a simple device for proportioning the amount of material from each bin. It consists of a series of sprocket-driven conveyors, each having three speeds. Thus, if material is to be taken from three bins in the proportion of 1 to 2 to 3, the conveyor for the first bin could be operated at slow speed, the second at intermediate, and the third at high speed.

Another company quarrying limestone interbedded with shale maintains a two weeks' supply of rock. The proportions of shale and limestone in the ledge are such that if the entire face is thrown down as a single bench and the mass thoroughly mixed, the resulting mixture has approximately the proper composition for cement. The large storage bin assists in obtaining a uniform mixture. The rock is drawn from the storage bin, pulverized, and conducted to 16 concrete tanks. Continuous samples are taken, the samples being analyzed every hour. From the data thus obtained the average analysis of the material in each tank is determined. The material is drawn from one, two, three, or a maximum of four openings in each tank, and a combination of tanks is determined that will give the desired mixture.

One New York plant maintains six storage bins. The material may be drawn from each bin by two worm feeds, each controlled by a 3-speed cone pulley. Thus six rates of removal from each bin are possible.

Meade suggests that the raw material, after it is passed through ball mills, be stored in tanks, the composition of the contents of each tank being slightly higher in lime than is desired. The material is sampled as it enters the tank and an analysis calculated for the entire mass. It is then an easy matter to calculate the small proportion of clay or shale that must be added to bring the mixture to the proper composition. At least three bins should be maintained for the mixture and one for shale.

A slight modification of this method is proposed by an Illinois cement company. The chemist of this company has found that the composition of the cinders from the boiler room is approximately the same as of the shale used in the cement mixture. It has been proposed, therefore, to run the mixture a little higher in calcium than is desired for cement, and to correct the mixture by means of an auxiliary cinder feed. By this means any fluctuation in composition could be corrected immediately, whereas by the method used at the time of the writer's visit the correction was made about 24 hours after the defective mixture has gone by.

The Semiwet Process

Fluctuations in the composition of raw materials may also be overcome successfully by use of the semiwet process, also called the semidry process. Both terms are misnomers, as the materials are just as wet as in the wet process. The term "semiwet" implies the subsequent wetting of materials originally dry. The advantages claimed for the semiwet process are intimate mixture of the particles and ease of obtaining a uniform mixture of the cement constituents. This latter phase of the process will be considered here. The process is best described by reference to a concrete example.

At an Iowa plant where the semiwet process is successfully employed, the raw materials consist of limestone and shale. The limestone is variable in composition, the calcium carbonate content varying from 72 to 92 per cent. The rock is shot down by blasts in churn-drill holes and is loaded with two steam shovels. The quarry operators aim to keep one shovel working in the high-calcium and the other in the low-calcium stone, and thus equalize the product to some extent.

The rock is crushed and passed through a ball mill, after which ground shale and water are added. The mixture is pulverized wet. The slurry, containing about 40 per cent of water, is conveyed by screw feed through horizontal troughs to storage tanks. Seven tanks are maintained, each having a capacity of about 600 barrels of cement. Samples are taken from the troughs with a continuous sampler and analyzed every hour. The composition of the contents of each tank is determined from these analyses. It is customary in some plants to maintain high-calcium and low-calcium tanks.

The method of making the final mixture is very similar to that employed for the dry process heretofore described. Knowing the analysis of the contents of each tank, the operator can easily work out a combination from two or more tanks that will give the desired composition. The eighth tank is reserved for mixing the slurry drawn from the storage tanks. An air agitator is employed to thoroughly mix the contents of the tank, and when so mixed the composition of the entire contents may be determined from a single analysis.

Advantages of the Semiwet Process

When wetted to the consistency of a slurry, a very intimate mixture of the particles may be obtained. It is claimed that grinding or pulverizing the material wet requires at least one-third less power than when ground or pulverized dry, although the counter claim is made that the wet material wears the pulverizing machinery much more rapidly than the dry. Pumping the slurry is a very simple and cheap method of moving it from place to place. Also materials mixed and conveyed in a wet condition make no dust.

The greatest advantage, however, is the ease with which variable raw materials may be mixed together and a final mixture of the desired composition obtained, as outlined above. This feature of the semiwet process recommends it as an alternative method in plants working on materials of variable composition.

Disadvantages of the Semiwet Process

The greatest difficulty in connection with the semiwet process is getting rid of the 30 or 40 per cent of water that has been added. The process was first employed where the water could be evaporated at small cost, because of cheap natural gas. Where powdered coal is used for fuel, drying is more costly. The difficulty has of late years been overcome with fair success by the use of long kilns. In kilns 160 feet long, so it is claimed, all the moisture is driven out during the passage of the material through the first 35 feet of the kiln. Therefore, the same output may be obtained with slurry in a 160-foot kiln as by the dry process in a 125-foot kiln. It must not be presumed, however, that the entire disadvantage of the semiwet process is the additional first cost and maintenance of long kilns. It is unwise to assume that the heat used in evaporating the water would, with a dry mixture in shorter kilns, be entirely wasted. By means of waste-heat boilers this heat may be saved and utilized.

ASSOCIATION ACTIVITIES

Give Us Open-Top Cars!

Producers Demand That Pits and Quarries Shall Not Be Discriminated Against

THE Chicago and Illinois associations of sand and gravel producers have passed strong resolutions against the undue preferential movement of open-top cars for coal loading. The resolutions are as follows:

WHEREAS recent action of the Car Service Section of the United States Railroad Administration clearly indicates undue preference is being given movement of open-top cars for coal loading; and

WHEREAS sand and gravel are basic commodities, the production and preparation of which to meet specifications of engineers and architects require heavy plant investment and large labor costs; and

WHEREAS any undue restrictions against free movement of cars for handling these materials would not only cause producers to assume heavy losses through curtailment of production, but would seriously interfere with road building programs and all other forms of public and private construction work and would incidentally throw thousands of men out of employment; therefore

BE IT RESOLVED by members of the Illinois Sand and Gravel Producers Association, who are engaged in the production and marketing of sand and gravel in Illinois, Indiana and Iowa:

1. That open-top or gondola cars must be distributed equally in respect of all commodities requiring that class of equipment and that such cars should not be termed coal cars.

2. That any undue preferential movement of open-top cars for coal loading is an unjust discrimination against sand and gravel.

3. That each member of this Association endeavor at all times to impress upon transportation officials the important position held by sand and gravel as basic building materials, with view to having them so recognized and to the end that all discriminations as to car supply, movement and other forms of service required of common carriers may be removed.

IT IS FURTHER RESOLVED that copies of this resolution be sent to Director of Car Service Section, United States Railroad Administration; to each Regional Director and to Superintendent of Transportation of each railroad serving members of this Association.

Urges Standard Sizing and Notation

Indiana Association Makes Recommendations to State Highway Commission

THE question of standard sizing of sand and gravel was the chief topic given consideration at the various district meetings of the Indiana Sand and Gravel Producers Association held during the last month.

As a result of the discussion of the subject, the following recommendation of sizes and numbers was approved by the executive committee, and these recommendations will be submitted to Mr. Bishop, chief engineer, Indiana State Highway Commission, for his consideration.

In talking on the subject, Mr. Bishop stated that the tendency was toward using a coarser aggregate for road construction and it might be found advisable to add a 3-inch size to the list.

This question is not merely of local

importance, since all the states in the Mississippi Valley are covered by the committee of state highway engineers appointed to investigate the subject. It may be, therefore, that the present agitation of the matter may result in bringing about a standardization of sizing which will be of great benefit to the industry.

STANDARD SIZING AND NOTATION FOR SAND AND GRAVEL

Numbers	Limits of Size
Sand	
0	1/10" down
1	⅛" down
2	¼" down
GRAVEL	
3	½" to ¼"
3-A	½" to ⅛"
4	¾" to ¼"
4-A	¾" to ⅛"
5	1 " to ¼"
5-A	1 " to ⅛"
6	1¼" to ¼"
6-A	1¼" to ⅛"
7	2 " to ¼"
7-A	2 " to ⅛"
8	2½" to ¼"
8-A	2½" to ⅛"

The sizes specified refer to the finished product and not to the screen perforations. It is assumed that the designated sizes of both sand and gravel are reasonably well graded between the maximum and minimum limits.

It is not expected that all plants are equipped to produce each size, but that such sizes as are produced shall be designated by numbers given.

It is further recommended that sand and gravel specially proportioned for concrete purposes, commonly called "concrete mix," shall be designated in the form of a fraction in which the numerator represents the size of the gravel as indicated by the foregoing numbers, and the denominator the percentage of the gravel in the mixture.

At a meeting of sand and gravel producers in Indiana Districts Nos. 3 and 4, held at Terre Haute, it was recommended that road gravel produced by passing the raw material through the plant in any manner should be considered as specially graded material and sold as such.

Many Lime Manufacturers at Atlantic City

Committee Will Make Suggested Changes in Organization and Report in October

THE interest of the lime industry in the matters for consideration at the Atlantic City meeting was evidenced by the fact that with one exception the entire board of directors was present on August 1, and in addition thirty-four manufacturers came to express their views on the future work of the Association.

A committee of five was appointed to formulate such changes in the constitution and by-laws as may be thought necessary for the welfare of the Association. This committee consists of the following:

John A. Kling, chairman.
Wm. E. Carson.
B. L. McNulty.
Chas. Warner.
Geo. B. Wood.

Any proposed amendments to the constitution and by-laws will be presented to the membership of the Association in harmony with the provisions of the present constitution and by-laws covering this subject.

On October 1 there will be a general meeting of the Association at Washington, at which time final action will be taken and the future of the Association will be determined.

The first meeting of the Trade Practices Committee was held in Atlantic City. Discussion of the problems which challenge the immediate attention of this committee was held. It was decided to request certain information from members touching on these questions so that the recommendations of the committee can be submitted to the entire membership at the general meeting on October 1st.

Restore Power to Commerce Commission

Indiana Wants It to Be Able to Suspend Rates When Advisable As Formerly

AT a called meeting of the Executive Committee of the Indiana Sand and Gravel Producers Association, held at Indianapolis on August 8, a resolution was passed favoring the resolution of the power of suspension to the Interstate Commerce Commission, but expressing disapproval of restoring such power to the state commissions. The full text of the resolution is as follows:

Whereas, all indications point to the imminence of a general advance in freight rates being authorized by the Director General of Railroads; and

Whereas, under the Federal Control Act the Director General of Railroads has power to initiate and establish rates without review; and

Whereas, freight rates on sand and gravel, by the provisions of General Order No. 28, were advanced 20 per cent a ton, or an increase of over 50 per cent, while other commodities bore an increase of only 25 per cent; and

Whereas, accredited officials of the Railroad Administration have repeatedly admitted the discrimination applied against sand and gravel rates as compared with other commodities, but have refused persistently to correct the injustices.

Now, Therefore, Be It Resolved, by the members of the Executive Committee of the Indiana Sand and Gravel Producers Association, in meeting assembled, representing the shippers of sand and gravel with plants located in Indiana:

1. That they are opposed to the establishment of freight rates without the privilege of a hearing being granted to the shippers affected.

2. That they favor the restoration of the suspension powers of the Interstate Commerce Commission, but not to the various State Commissions.

3. That they, therefore, urge upon the members of the House of Representatives the passage of the Cummins Bill, designed to restore the suspension powers of the Interstate Commerce Commission, as originally passed by the Senate, but not as amended by the House Committee on Interstate and Foreign Commerce.

Be It Further Resolved, that a copy of this resolution be sent to the Committee on Interstate and Foreign Commerce of both the Senate and the House of Representatives, the Indiana Senators and Representatives in Congress, and the Director General of Railroads.

Houston Ought to Help

So Sandles Asks Him to Give a Lift in Getting Cars to Carry Agricultural Limestone

SANDLES is nothing if not resourceful. So early in August he indicted to the Secretary of Agriculture, David F. Houston, one of his characteristic letters, which get straight to the point, with even the punctuation marks left out as unnecessary. Here is what he said:

Some of our manufacturers of agricultural limestone are fearful that cars will not be available for limestone shipments during the rush season of August and September.

They report to me that many cars are crippled and unusable; that railroad men advise them that many engines are in bad condition

High cost of living makes food production a most serious question. All signs indicate a big sale and shipment of agricultural limestone if cars can be had

Our members have asked me to request your helping hand in urging the United States Railroad Administration to be prepared to take care of this business with as few handicaps as possible

The industry will appreciate your interest in this matter.

Assessment Levied

The executive committee of the National Crushed Stone Association recently authorized a second assessment for 1919 of 2 cents for each 100 tons output as reported for 1918.

CHOICE OF METHODS FOR FIRING DYNAMITE AND HIGH EXPLOSIVES

Points to be Considered	Blasting Cap and Fuse	Electric Blasting Cap	Delay Electric Blasting Cap	Delay Electric Igniter and Cap
Full energy from explosive	1st	1st	1st	1st
Freedom from misfires	3d	1st	1st	2d
Relative safety to blaster	3d	1st	1st	2d
Relative resistance to adverse storage	2d	1st	1st	2d
First cost	1st	2d	4th	3d

Analyzes Methods of Firing Blasts

J. B. Stoneking Grades Them on Several Points of Efficiency

A CAREFUL analysis was recently made by J. B. Stoneking on the relative merits of various methods for firing blasting powder and dynamite. The result of his investigation was published in the Du Pont Magazine. Tables here reproduced show the result of his investigation, with the various methods of firing classified with reference to the different points of efficiency to be considered. These points are as follows:

First: It must secure the full energy from the explosive in the form of useful work.

Second: It should be absolutely free from misfires.

Third: The blaster or user should enjoy maximum safety while using it.

Fourth: It should be able to resist adverse or poor storage conditions without deteriorating and thus becoming more or less useless.

Fifth: The cost should be low. The factor of a low first cost, however, is not a true criterion of the cheapness of any given method of detonating or igniting explosives. Though a method might be very cheap in first cost, it might not deliver the full energy of the explosive and would thus require the use of a greater amount of explosive than would otherwise be necessary. It might give rise to a large number of misfires, which are dangerous to the blaster and generally result in a total loss of explosives. It might also be unsafe or at least, comparatively unsafe, and one or more serious accidents would bring the expense far above the greater first cost of some safer method.

An increased wage schedule was put into effect on August 3rd at the Atlas Portland Cement plant, Hannibal, Mo. All departments shared in the increase, which is said to be a substantial one.

CHOICE OF METHODS FOR FIRING BLASTING POWDER

Points to be Considered	Miners Squibs	Safety Fuse	Electric Squibs
Full energy from explosive	3d	2d	1st
Freedom from misfires	3d	2d	1st
Relative safety to blaster	3d	2d	1st
Relative resistance to adverse storage	3d	2d	1st
First cost	1st	2d	3d

Big Demand for Gravel in Dallas

Engineer Says County Needs More Gravel Pits to Supply Market

TEXAS is now in the midst of an unprecedented building boom and is also building more highways than at any previous time in her history, and these conditions conspire to make an unusually heavy demand for gravel, according to Ray Miller of the J. Fred Smith Gravel Company of Dallas, Texas. But with the unusual demand, it has been found impossible to fill all orders, or even a majority of orders, on account of the transportation situation and the inability to get cars in which gravel and sand is shipped. Similar reports are made by other gravel companies in Dallas, including the West Dallas Gravel Company, Trinity Sand and Gravel Company, Vilbig Bros., Clum Gravel Company, and the Cooper-Storey Company.

Gravel companies in Dallas that sell their products delivered on the works, such as the West Dallas Gravel Company, the Clem Gravel Company and Vilbig Bros., have done a heavier business than those that sell their products f. o. b. the pits. Among the latter are the J. Fred Smith Company, Trinity Gravel Company and several others. The transportation problem and car shortage has little influence on the business of these firms that deliver their gravel on the works, for motor trucks are used almost exclusively and the greatest problem for these firms is the labor shortage.

Gravel f. o. b. the pits in Dallas is being sold at $1 to $1.25 a yard, while prices delivered on the works vary greatly, being dependent on the length of haul, size of order and other conditions.

The J. Fred Smith Company reports most of gravel it is now furnishing is being used for concrete work. This company handles a pit-run gravel that is an excellent concrete aggregate without screening or re-mixing, and for this reason it is generally used in concrete work. For this pit-run gravel the company is receiving $1.25 a yard f. o. b. pits near Dallas. Considerable gravel is also being sold for railroad ballast and highway construction work.

Few gravel companies in Dallas have experienced any difficulty in keeping labor, although several wage advances have been granted and pay is now regarded as unusually high. For common laborers at the pits, $4 a day is being paid, while the gang bosses, machinists and other expert laborers are being paid much more.

The big problem in the transportation situation has been the car shortage. According to Ray Miller of the J. Fred Smith Company, the car shortage was just being relieved when the strike situation resulting from the demands of the brotherhoods grew serious and caused the railroad companies to shut down on the car supply. Since that time cars have been sent to the mines, returned to the owning lines and otherwise employed, so that few have been available for gravel hauling.

George D. Fairtrace, city engineer, said there are not enough gravel wagons in this county and there is a shortage of freight cars to haul the gravel to Dallas.

"Dallas county needs fifty gravel pits thirty-five to forty more than it has now, and the need for them is going to be felt more keenly when the great road-building program is under way," Mr. Fairtrace said. "Gravel is now selling at $1.35 to $1.50 a cubic yard at the pits. It costs about $2.31 f. o. b. Dallas. It costs about 25c a cubic yard to unload it and 40c a cu-

bic yard to haul it from the car to the place where it is needed. This makes it cost about $3 a cubic yard. The average gravel wagon holds one and a third cubic yards.

"The gravel is usually sold at the pit to the highest bidder who happens to be on hand when a car or a wagon is loaded, and there is usually a crowd on hand to do the bidding."

Louisville Trade Suffers Car Shortage

Prices at Reasonable Level, Considering Conditions Which Prevail

WHILE the crushed stone trade as a whole in Kentucky is doing very well there is some curtailment on account of car shortage which seems to be more acute in Kentucky than anywhere else. Also locally the stopping of work at Camp Knox has, for the time being at least, suspended a good branch of trade. This, it is hoped, will be revived later on for there is every expectation that the work will be taken up again at Camp Knox and the plans completed.

R. B. Tyler, of the R. B. Tyler Stone Company, says the current prices on crushed limestone range from $1.00 to $1.25 per ton depending upon specifications and the location of the plant. For ground limestone for agricultural purposes the range of prices is even wider, running from $1.50 to $2.50 per ton depending upon the fineness and location.

Mr. Tyler says that the trade with him is curtailed somewhat now from two general causes: a shut down of work at Camp Knox where he has supplied considerable material, and the car shortage which interferes with shipment. It is expected that a meeting of the Kentucky Crushed Stone Association, of which R. B. Tyler is secretary, will be held here during September, perhaps in Fair week, which is the week of September 8 to 13.

The future outlook for stone crushing is very bright because many good roads plans are under way in the state including a River Road from Louisville to Paducah.

The business in river sand and gravel is doing very nicely. Louisville is a great center for distribution of river sand and at this writing the local sand and gravel men report business good both locally and in carload shipment throughout the territory of distribution from Louisville.

The current prices for out-going shipments in carload lots are 85 cents a ton sand and 75 cents for gravel. In the local trade the prices are made per cubic yard at the sand yard and delivery is charged for extra. Prices at the yard are: for sand $1.05 per cubic yard, for gravel $1.15. The extra charge for delivery ranges from $1.40 a yard for sand on short hauls and $1.50 for gravel to as high as $2.50 for some of the longer hauls.

J. E. Lloyd, in charge of the Louisville yard of the E. T. Slider Company, says trade is very good with them both in car shipments and for local delivery. Also he reports that trade is equally good with Captain Slider over at the New Albany yard. The E. T. Slider Company has the jumbo sand digger of the Ohio River and does quite an extensive sand and gravel business during the summer months.

The Atlas Coal Company which formerly did considerable business in sand and gravel has practically abandoned this and now confines its efforts largely to coal. J. T.

Hygrade Limestone Co., Gouverneur, N. Y., capitalized at $6,000, has been incorporated by E. D. and F. H. and F. J. Porter.

Cincinnati Situation

Wages High, but No Complaint of Labor Shortage

IN AND about the Queen of the West, Cincinnati, dealers in sand, gravel and crushed stone are strangely at variance, at just this moment, as to the condition of the industry; especially as to sales-prices and the labor-problem involved.

The Moores-Coney Company, which is one of the largest of the sort in this country, in reply to a query recently, states that "Prices just now are steady—tending even to high; but not exceptionally high. Work, what is more, is going on well.

"All the sand and gravel producers with whom we come in contact," their office added, "are fairly busy, and prices brought are fairly good.

"On the other hand, though, it must be admitted, there is nothing unusual 'on' at present. Things have been going on well for the past thirty days. The labor situation is quiet; there have been no strikes of any sort. There has been a really good supply of labor available, too, at that; no shortage whatsoever."

The L. McCammon Brothers, of the same city, state that they use substantially only drivers by way of labor and that they have no trouble at all in getting these.

Wages, however, are higher than they have ever been, at least ten per cent higher than heretofore.

"On other hand," they state, "we can hardly say there is plenty of business. People, it seems, don't want to pay the high prices. As matter of fact, though, these prices are not much higher than what they were a year ago; but they *are* high enough to keep many from building."

The Cincinnati Quarries Company also throws an interesting sidelight on the general situation, which may be taken as typical of what most the other concerns would tell:

"Sales prices, hereabouts, have been about equal latterly," they state.

"Not only has there been no advance as yet, but there has been a substantial decline in the price of sand and gravel.

"Quite a few of us, that is to say, reduced the price on these materials in order to stimulate the building industry. We had been requested by the supply houses to do this; in order to help 'boom' business all around so, but we are wondering whether it really *did* bring on the 'boost' so planned. In fact, the supply houses who asked us to cut in this way have themselves already increased their prices to somewhere near the former norm.

"We reduced our price by twenty cents a ton, to help them, and have not yet put this back to where things were before. The labor situation around Cincinnati shows a decided tendency to even higher prices and, even willing to pay these, labor is still scarce. By the first of September, when men come out of the harvest fields, however, we rather hope that things will be better along these lines.

"As to actual business, there are several very large buildings in contemplation which will help some.

"But, as every man in the trade knows, what *we* want is the erection of a lot of small, or medium-priced homes. These are our very best trade when all is said and done.

"Of these type houses there is substantially no building now going on; so that you can draw for yourself the conclusion of the general effect upon our trade." F. K.

A Portland cement plant is now being constructed at Singapore, Straits Settlement, at a cost of $1,000,000. It will be equipped with American manufactured machinery.

THESE illustrations show the new sand and gravel plant of the Columbus Builders' Supply Company at Columbus, Ohio. It is located on West Spring Street, close to the business section of the city, and with the best of railroad connections, giving it command of a very desirable market.

The plant is equipped with new machinery throughout, furnished for the most part by the Jeffrey Manufacturing Company of Columbus.

The erection of this plant will complete the various lines of building material now handled and on display by the Columbus Builders' Supply Co., at 145 North Front Street.

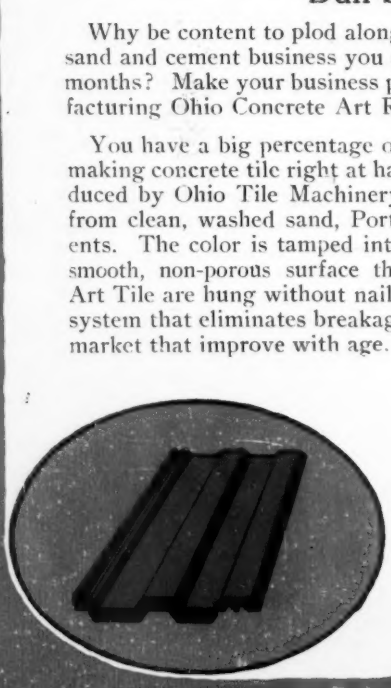
Make Your Sand ad
Pay a Profit

GET the idea out of your head that because winter is usually a dull season with you, next winter must necessarily be dull also.

Manufacture Roofing Tile During Your Dull Season

Why be content to plod along with only the small amount of sand and cement business you ordinarily get during the winter months? Make your business pay a handsome return by manufacturing Ohio Concrete Art Roofing Tile.

You have a big percentage of the raw materials required for making concrete tile right at hand. Ohio Art Roofing Tile produced by Ohio Tile Machinery are made by a secret formula from clean, washed sand, Portland cement and other ingredients. The color is tamped into the face and produces a hard smooth, non-porous surface that *stays* clean. Ohio Concrete Art Tile are hung without nails on purloins by an interlocking system that eliminates breakage. They are the only tile on the market that improve with age.



The Ohio Tile Mine

WILLOUGHBY,
(Near Cleve. O

ad Cement Business
it Next Winter

Unlimited Market Right at Your Door

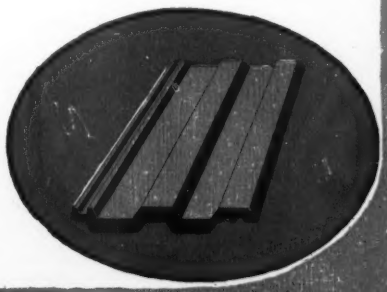
Ohio Concrete Art Tile compete favorably in price with ordinary roofing materials, and are less expensive than clay tile. They are fire-proof, weather-proof and exceptionally attractive in appearance.

In every community great building activities are under way. Every building must have a roof covering. Make Ohio Concrete Art Roofing Tile and supply the roofs in your community with considerable profit to yourself—a profit that you are not now making.

Ohio Concrete Art Roofing Tile can be produced wherever sand and cement are available. These tile are made on machinery manufactured exclusively by the Ohio Tile Machinery Company. These machines include a complete line of forms for special finishing tile, so that all types of Roof can be covered.

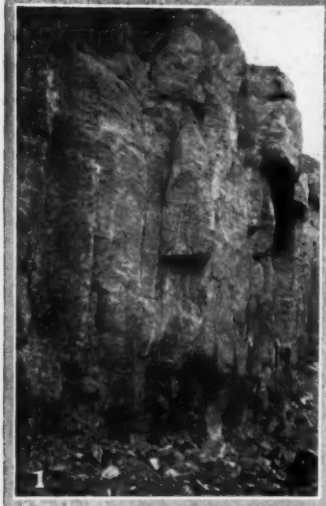
Decide Today

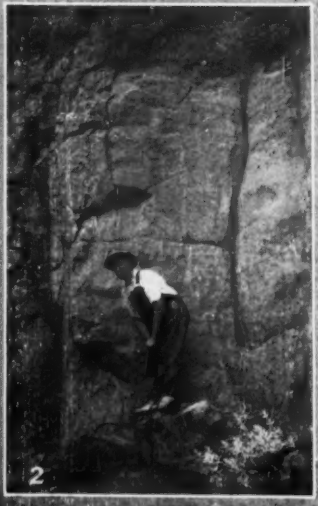
There is a waiting and ready market right at your door and in your community for Ohio Concrete Art Roofing Tile. Make up your mind today to get the utmost profit out of this new opportunity. Write now for further information regarding Ohio Concrete Art Roofing Tile and prices of machinery, before some other hustler grabs off your territory.

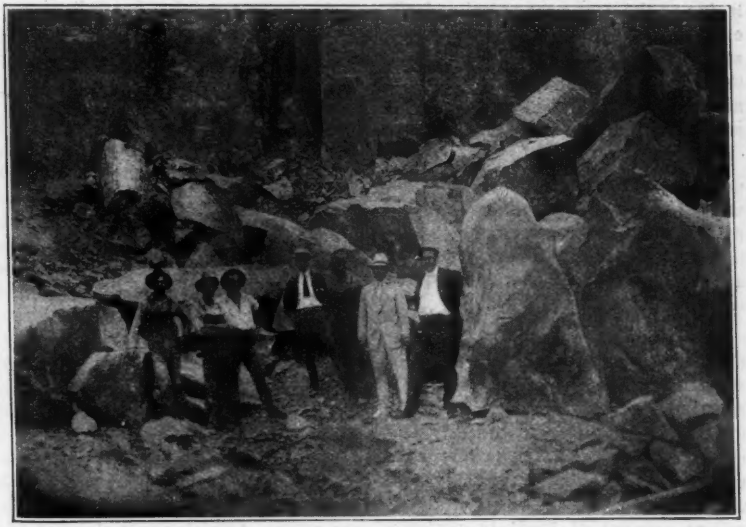


ile Machinery Company

LLOUBY, OHIO
Near Cleveland, Ohio)







Quarrymen and visitors getting together after the blast.

Clipping a Cliff

Recent Colorado Blast Picturesquely Described

BY J. SAMPSON

PICTURESQUELY jutting up into the sky at the mouth of Clear Creek Canon, near Golden, Colorado, a magnificent cliff scowls down upon the traveler from the plains, as if it were a sentinel placed there by Providence to protect the stately Rockies from the intrusion of unworthy visitors. It was from the top of this cliff that the keen eyes of the Apache and Ute of the old days once scanned the plain below for the caravan of the white settler and it was here that the first discoverer of gold, John Gregory, found the landmark that led him to the hidden treasure.

Today the cliff is the scene of great activity. A continuous stream of tram cars follow each other up and down the mountain, depositing their loads of stone in the great crusher at the foot, where a long train of steel railways cars is being loaded with the finished product.

Thousands of automobiles pass the cliff every day on their way to Denver's mountain parks, little dreaming that the marvelous smoothness of the road over which they have traveled is due to the fact that its foundation comes fom the quarry concealed in the cliff above their heads.

The quarry is owned and operated by the Connor Stone Crushing Company, of Denver, and supplies much of the crushed stone for the highways of Colorado and neighboring states.

Not a little of its unusual success

DESCRIPTION OF ILLUSTRATIONS ON OPPOSITE PAGE

1. Before Shooting—The hanging columns of rock ready to be dynamited.
2. Setting off the Great Blast—One pull on this battery lever sent 300 feet of cliff tumbling to the quarry floor.
3. At this point the whole mountain rocked and rolled under our feet while great rocks hurled through the air above our heads.
4. The first puff of smoke from the base of the cliff just after the command "Fire!"
5. Mr. Connor looks pleasant—standing on top of one of the rocks made ready by the dynamite for breaking up into good roads foundation.

is due to the very economical and efficient drilling methods employed. The stone is a feldspar of peculiar hardness, the holes are of unusual depth, and the formation is both irregular and erratic.

Because of these conditions and because their method of quarrying provides only one drill runner for each drill, a drill was required that would hit hard, drill fast, would not stick and could be easily operated by one man.

After experimenting with a great many different types and sizes of drills, the quarry was finally equipped exclusively with the Waugh Model 55 Clipper Drill, that being the only machine that could fulfill the requirements of the situation. This drill, mounted on a tripod, has given an excellent account of itself in performance.

Recently a party of Denver men, on the invitation of Mr. Connor, Jr., whose winning personality, unbounded energy and forceful, tactful manner of handling men have contributed largely to the quarry's success, visited the quarry to witness a big "shot."

The rule in the Connor quarry is "Safety First" at all times and it can be said to Mr. Connor's credit that, although the statistics for 1917 showed a mortality among quarry workers of 83 for each 1,000 in the United States, not a single accident of any sort has occurred in this quarry in all its years of operation.

The rock hangs down from the top of the cliff in gigantic columns and beneath these had been drilled 18-foot holes at frequent intervals for a distance of 300 feet along the mountain. These holes were "sprung" and loaded with dynamite, all being connected by wiring with a firing battery safely screened behind a pillar out of the range of flying stone.

At the command, "Ready," quarrymen and visitors all took to their heels and found refuge in the rocks several hundred yards from the scene of action.

A death-like silence ensued. Then Mr. Connor, raising his arms high above his head, signaled that all was in readiness for the blast. The man at the battery could be seen pulling up the handle that made the electrical contact. Then the whole face of the cliff heaved upward and bellied outward like a sail in a breeze. A few puffs of smoke issued from the base, followed by a tremendous explosion. The mountain was obscured by a dense cloud of smoke and dust, and the deed was done.

Not until the smoke and dust had cleared away and the visitors had come out of their hiding places was the extent of the dynamiter's work appreciated.

Great rocks, literally as "big as a house" covered the floor of the quarry for the entire 300 feet and the workmen swarmed over them like ants, full of enthusiasm at the prospect of breaking them up into good roads foundation stone.

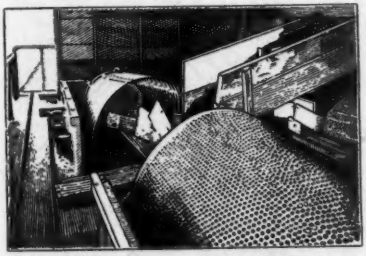
It was a thrilling spectacle for the visitors and they all came away with a profound respect not only for Mr. Connor and his men, but for the little Clipper drill that could do what nothing else but faith can do—move mountains.

Glass manufacturers in Canada have been largely dependent in the past upon the United States for their supplies of glass sand and sodium carbonate. However, the new plant of The Brunner-Mond Company, at Amherstburg, Ontario, Canada, at which sodium carbonate is to be made by the Solvay process, is expected to supply all of Canada's needs for soda ash. The capacity of this plant is reported to be about 120 tons per day. Some glass sand is being secured from Oneida, Ontario, but it is said to be of an inferior grade, and only suitable for the manufacture of the cheaper grades of glassware.

Screens at Right Angle to Flow

This Is Unique Feature of Two Plants Operated by Well Known Michigan Company

THE United Fuel and Supply Company of Detroit has two plants, at Oxford and New Hudson. At both of these plants the innovation has been introduced of setting the screens at right angles to the flow of material, instead of having them



mounted parallel to the bins in the ordinary way.

This arrangement, as shown in the illustration, divides the flow, half of it passing to each series of screens.

Not the least advantage of the arrangement is the saving in height. It is found also that it gives a good drive layout, and agitates the material by deflecting it before it reaches the bins.

Hauling Crushed Stone

Motor Trucks Do Excellent Work on Ohio Roads

A RECENT illustration of how macadam roads are built in Ohio is that reproduced on this page. It shows four 5-ton Acme trucks operated by the J. L. Seeds Company of Grove City, Ohio.

These trucks are making two round trips per day from Marion, fourteen miles to the trip, hauling crushed stone and other necessary material.

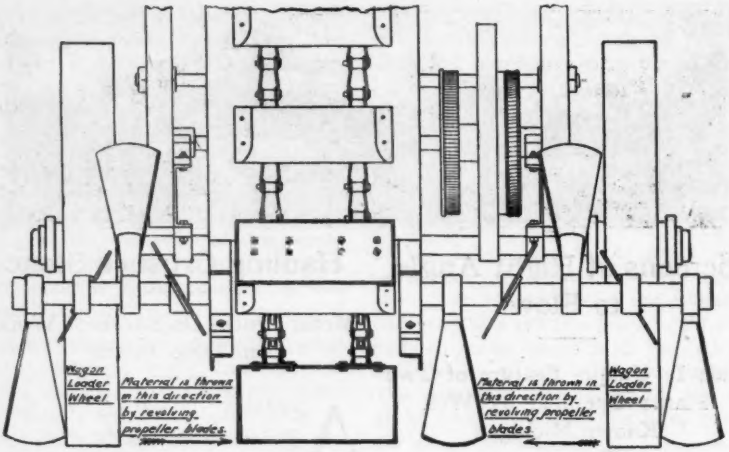
On the return trip they bring sand to contractors in Marion who are building asphalt streets in that city.

For the latter work they receive $4.20 per load, in addition to their regular work of hauling stone and cement for road jobs.

Celebrated Rate Case

Those interested in the Indiana-Illinois rate case, hearing of which was concluded on July 31, have been directed to submit briefs not later than September 15. A tentative report will be rendered by the Commission on October 1, and oral argument will be made before the entire Commission in Washington on October 15. It is not at all likely that final decision will be rendered before January 1.

Premier Sand & Gravel Co., Wilmington, Del., capitalized at $100,000 has been incorporated to acquire lands containing sand, stone, rock, gravel and clay and develop the same.


Wagon Loader Wheel
Material is thrown in this direction by revolving propeller blades
Material is thrown in this direction by revolving propeller blades
Wagon Loader Wheel

Working End of Wagon Loader

The above drawing shows the working end of a wagon loader. This is the type of loader which backs into a pile of sand or stone and travels right through it. This is accomplished by means of the deflectors at the sides working in conjunction with the bucket elevator, throwing the material over toward the elevator where it can be picked up by the buckets.

This particular type is made by the George Haiss Manufacturing Company, New York.

Careless Tamping Kinks Fuse

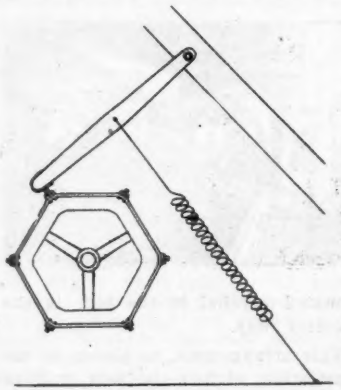
One disadvantage of the cap and fuse method of blasting is that a kink in the fuse may cause a missfire.

Such a kink may easily occur from careless tamping, as shown in the illustration.

Simply a Knocker

A device can be easily made for keeping hexagonal screen free from clogging, as shown in this sketch.

The knocker arm can be attached to the rafter of the building or any convenient point of support, and a strong coil spring used to keep the free end



closely crowded against the screen, so that as each rib passes from under it, it will rap the screen violently.

The end of the arm should be bound with iron to prevent wear.

Two or three of these can be used along the length of the screen if nec- iron to prevent wear.

NEWS FROM THE FIELD

American Silica Sand Co., Utica, Ill., has increased its capital from $25,000 to $50,000.

A campaign to encourage the use of limestone for homes is to be launched in Cleveland, Ohio. The Indiana Limestone association is perfecting arrangements to furnish limestone veneer in small sizes of about the dimensions of a brick, for use in building moderate priced houses.

It is stated that the public domain commission will not permit dredging companies hereafter to remove gravel or sand within the Berrien County, Mich., limits. Property holders have protested that the action of the dredgers in taking away sand and gravel from the beach is causing their beaches to be washed away and injuring their property.

The Monmouth Stone Co., Kirkwood, Ill., it is announced by its president, Reid Everet, will be ready to market the limestone fertilizer from the quarry on the R. L. Everett farm, near Gladstone, by fall. Three big Caterpillar tractors will shortly be set to work stripping off the top surface. Experts pronounce the stone of great value for fertilizer.

The Fate-Root-Heath-Company, of Plymouth, Ohio, announces that on July 1st it succeeded to the business of the J. D. Fate Company and the Root-Heath Mfg. Company, the consolidation greatly increasing its capacity and resources and enabling it to meet every demand for Plymouth industrial locomotives, clay working machinery and the other products of the two companies.

The Texas Portland Cement Company of Houston, Tex., will meet the increasing demands for their product by doubling the capacity of their plant on the Houston Ship Canal. Seven hundred thousand dollars will be expended in constructing additional buildings, a wharf, and purchasing new machinery. The improvements will give the company a daily output of 2,000 barrels of cement.

An important deposit of high grade silica sand has recently been discovered near Munroe, Louisiana. This deposit is estimated to contain about 18,000,000 yards of sand and gravel, underlain by large beds of glass sand. It is located near a railway, and convenient to water and gas.

E. W. Hawke, recently connected with the Columbus Consumers' Supply Company, Columbus, Ohio, has been appointed direct manufacturers' sales agent for Michigan Portland cement, Ohio lime, Northwestern expanded metal lath and Ohio fireproofing. He has taken an office in the Citizens Bank building, Columbus.

Owing to the largely increased demands on the quarry and plant of the Chico-Bridgeport Cement & Stone Company, located at Morris Spur, 47 miles northwest of Fort Worth, it has become necessary to greatly increase the capacity of the plant and its equipment. For this purpose the company has taken out a charter, under the laws of Texas, in the sum of $450,000, and E. C. Dodson and other officials are now busily engaged in the offices of the company in the Andrews building, Dallas, in perfecting arrangements for the immediate improvement and enlargement of the plant.

Will Talk Good Roads

The County Commissioners' Association of Indiana will meet in Indianapolis September 24, 25 and 26.

F. W. Connell, secretary of the Indiana Crushed Stone Association, says that every effort will be put forth to make this the biggest convention the commissioners have ever held. Good roads will be the main topic of discussion.

Chico-Bridgeport Cement & Stone Co., Chico, Tex., capital stock $450,000, has been incorporated by C. L. Johnson, E. C. Dodson and others.

The executive offices of the J. M. Forbes Sand Company, which have been located in Lincoln, have been moved to the Chamber of Commerce Building, Waltham, Mass.

The Business of Making Concrete Roofing Tile

BY D. HELMUTH

President and Manager Empire Tile Company; President, Concrete Roofing Tile Association, Cleveland, Ohio

In 1914 while in the construction business, I had numerous inquiries from clients regarding ornamental roofing tile to be used in conjunction with other fireproof materials in the construction of medium priced homes. It was quite evident there was no tile suitable for the purpose other than clay tile, which of course, was prohibitive owing to the high cost, and from the fact that these tile were made in one color only.

Experience and interest in the question caused me to do considerable thinking, and I wondered why so little thought had been given to the beautifying of the roof of a moderate priced home, and why no decorative concrete or other tile of medium price had been developed. I began further investigation and finally located a small concrete roofing tile plant in the East, in which they were making roofing tile in a crude manner on machinery brought from Europe. While there, I obtained sufficient tile for one roof of a color desired.

After seeing the tile, I then discovered a discrimination among the roofers against applying this product, and was forced to lay the tile myself. After the contract was completed, and noting the artistic effect secured, and the comments of architects, contractors and home builders, I decided to order more of this type of roofing material; and before I realized it, I had placed orders for 67 car loads of this roofing tile for work in Cleveland, Ohio, alone. The ready sale of the tile and the pleasure of satisfying my customers, caused me to decide upon entering the business of making tiles of colors which I knew to be both pleasing to the eye, permanent in character and fireproof in structure.

My first problem was to secure machinery adapted to the making of a high-grade tile and with the necessary parts to enable me to make special shapes, so that the plant would be equipped to make any form required to complete the roof. On looking over the field of machinery manufacturers, I failed to find an equipment on which I could produce tiles and shapes, complying with the city building code, and that would pass the judgment of high class architects. Knowing full well what I was up against, and believing improvements in machinery and equipment would come, I contracted for some of these machines, which arrived in just the condition I expected they would come. However, I went ahead and did all I could do, to place the equipment in shape. We began to manufacture the tile only to find we were compelled to purchase and make additional equipment, at an expenditure three times that of the original contract for the complete roofing tile equipment. After securing this additional equipment we discovered the tamping bars used in making the tile entirely too rough and caused considerable trouble and expense. However, we finally got started and made some 50,000 tile, which with changes in machines and persistent effort on our part, proved to me conclusively that with further experience we would meet a success which would warrant the labor and money to be expended.

It became necessary also, to work up our own plans and specifications, for applying the tile as well as the metal work used in connection with the tile; this I am glad to say has worked out beautifully and in a perfectly satisfactory manner.

The problem of securing permanent colors was then taken up, as the colors represented to us (under a great trade secret) began to fade, causing us further worry, until, after consultation with expert chemists, and exhaustive tests, we have developed four standard permanent colors—red—green—grey—and brown, which we have adopted and standardized and are now furnishing the trade.

During the days of early experiments, we continued to receive many inquiries for this product, and though our competitors began criticising the tile, we were continually picking up customer after customer. We ignored all critics, and strove to improve both the tile and equipment, and found the enterprising home builders in every section of the city, making inquiry for our tile, for the widest publicity was given the product, from the fact of its artistic effect, low cost, fireproof and everlasting quality.

At the beginning of our operations, we were disappointed in the cost of manufacture, as machinery manufacturers claimed we could manufacture the product for $2.50 per square and that these same tile could be sold at from $6.00 to $7.00 per square. We soon found these statements a wild, imaginary dream, whether conscienciously made or otherwise. Upon due consideration, we decided finally to adopt our own methods as to the process and mode of operation of the plant, and began operating upon piece system basis. This has worked out nicely and is both satisfactory to our employes and as well as economical to us.

We believe today that we can truthfully say that the tile industry, if given the usual business care, can be started without the worry and expense to which we have been placed, and as we have covered over 1,400 complete roofs and have orders booked ahead for more than 150 houses, prove conclusively that the material and work which we have placed upon the market has proven entirely satisfactory, so that today we are compelled to turn away good business owing to the capacity of our plant not being sufficiently large to supply the demand. We have concentrated our efforts on labor-saving devices, and through the efficiency of our organization we have increased the output of our machines from 250 tiles each man per day to 600, the size of tile being 9x12¾ inches. We are at the present time making a uniform quality of product of permanent standard colors of a superior quality with which we give the customer a service direct from the manufacturer to complete roof service.

We feel that our efforts are bringing the desired results, we are now fully satisfied with the tile business and price which we secure warrant us in expanding our business considerably. The fact that homes covered with our tile usually bring from $500 to $2,000 more in profit over the other types of roof to the builders, causes him to become our friend and staunch supporter.

Recent Patents

The following patents of interest to readers of this journal recently were issued from the United States Patent Office. Copies thereof may be obtained from R. E. Burnham, patent and trade-mark attorney, Continental Trust Building, Washington, D. C., at the rate of 20 cents each. State number of patent and name of inventor when ordering.

1,310,570. Dredge-bucket lip. Lewis D. Hopfield, Natoma, Cal.

1,310,645. Gravel-screen. Fitch H. Beach, Charlotte, Mich.

1,310,798. Gyratory crushing apparatus. Joseph E. Kennedy, New York, N. Y.

1,311,142. Shield tunneling-machine. Douglas Whitaker, Leicester, England.

1,311,143. Shield tunneling-machine. Douglas Whitaker, Leicester, England.

1,311,396. Coal-drill. Charles F. Helflinger, Durham, Wash.

1,311,535. Pulverizer. Harry J. Shelton, St. Louis, Mo.

1,311,622. Coal-chute. Clarence Schock, Mount Joy, Pa.

1,311,659. Mining-car. John C. H. Lubken, Westmont Borough, Pa.

1,311,901. Locking device for coal-cutting trucks. Michal Krupa, Jerome, Pa.

1,312,233. Fullering-block for rock-drill bits. Orrin B. Camp, Engelmine, Cal.

1,312,545. Screen. Frank E. Johnson, Salt Lake City, Utah, assignor to American Manganese Steel Co., Chicago, Ill.

1,312,594. Reclaiming and conveying apparatus. Francis L. Stuart, Washington, D. C., assignor to International Conveyer Corporation, New York, N. Y.

1,312,664. Screening apparatus. Joseph E. Yernaux, Puteaux, France.

1,312,705. Dumping-bucket. John C. Mitchell, East Orange, N. J.

1,312,867. Coal-cleaning apparatus. William J. Patterson and Ross M. Bickley, Pittsburgh, Pa., assignors to Heyl & Patterson, Inc., same place.

1,313,111. Belt-conveyer. William K. Page, Orange, N. J., assignor to Chile Exploration Co., New York, N. Y.

1,313,217. Loading-machine. George W. Jackson, Chicago, Ill., assignor to American Power Shovel Co., Milwaukee, Wis.

1,313,218. Loading-machine. George W. Jackson, Chicago, Ill., assignor to American Power Shovel Co., Milwaukee, Wis.

1,313,219. Tractor. George W. Jackson, Chicago, Ill., assignor to American Power Shovel Co., Milwaukee, Wis.

1,313,220. Bucket structure for excavating and like machines. George W. Jackson, Chicago, Ill., assignor to American Power Shovel Co., Milwaukee, Wis.

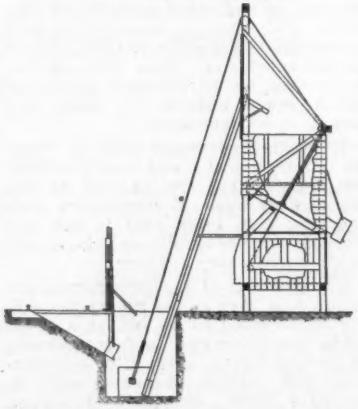
1,313,221. Boom and bucket control for loading and excavating machines. George W. Jackson, Chicago, Ill., assignor to American Power Shovel Co., Milwaukee, Wis.

Will Design Asbestos Plants

The K-B Pulverizer Company, 92 Lafayette Street, New York City, have inaugurated a new department for the design and equipment of asbestos products plants.

They are in a position to submit plans and estimates and supply machinery for the manufacture of all asbestos products.

Portable Unloader



This drawing shows the side elevation of a portable unloader being sold by the Galion Iron Works and Manufacturing Company, Galion, Ohio.

The one shown is an 18-ton type, and the cut gives a good idea of how the material is dumped from the car into the loading pit, and carried to the bin for loading to wagons or motor trucks.

Elevating, Conveying

and

Power Transmitting MACHINERY

for

Gravel, Sand and Stone Plants

SCREW AND BELT CONVEYORS.

BUCKET ELEVATORS, with buckets on chain or belt, furnished with or without steel casings.

BUCKETS—standard types in steel or malleable iron, steel buckets of special design made to your specifications.

GEARS—MACHINE MOLDED or with CUT TEETH.

CHILLED RIM SPROCKETS.

CHAIN—standard malleable detachable, Ley bushel, steel or malleable roller.

SHAFTING, PULLEYS, BEARINGS, FRICTION CLUTCHES.

Send for Catalogue No. 38

H. W. CALDWELL & SON CO.

CHICAGO

Western Ave., 17th and 18th Sts.

Fate-Root-Heath Company

In order to meet the large and growing demand for Plymouth Industrial Locomotives, Clay Working Machinery and other Plymouth products, The Fate-Root-Heath Co. of Plymouth, Ohio, has been incorporated with a capital stock of $1,000,000.00 and has taken over the property and business of The J. D. Fate Co. and The Root-Heath Mfg. Co., the plants of the two companies adjoining.

The J. D. Fate Co. was started in Plymouth in 1887, and has been in successful operation since then. Its original business consisted of the manufacture of brick and tile-making machinery, and it has built up and maintains an unexcelled reputation and a large established trade in this line. In 1914 they brought out and perfected the Plymouth gasoline locomotive for construction, mining and plantation work, and intra-plant switching. This locomotive has met with wonderful success, and is used by some of the largest contractors and industrial concerns in the world. One concern alone has seventeen and another fourteen in daily operation.

The Root-Heath Mfg. Co. was started in Plymouth in 1895. It manufactures a line of hardware specialties consisting of Shoe Repair Outfits, Shoe Lasts and Stands, Riveting Machines, Corn Shellers, Grist Mills, etc., which sell to jobbers all over the United States. In addition to its general line of products it has developed a patented machine for sharpening lawn mowers which has a national reputation. The company also has an extensive foreign trade, and its business and prospects were never better than at present.

The new company owns about 12 acres of land upon which are now located 15 buildings with approximately a ground floor space of 160,000 feet. The present buildings are of brick and iron construction, and the equipment is modern in every respect. A new foundry building is now under construction in addition to the present foundry which will give a floor area of 300 by 200 feet; also a new power house and two story office building. Fully $150,000 will be expended in new construction and equipment, all contracts having been placed, and equipment purchased.

Dollars and Sense

Practically all of the State Agricultural Experiment stations are giving a big boost to the use of raw agricultural limestone. County agents generally over the entire country are urging its application to farm land. Indications point to a tremendous growth in the use of this soil corrective.

The National Agricultural Limestone Association has just issued a new and unique text book, "Dollars and Sense," on the use and application of agricultural linestone. It is generally illustrated, a storehouse of wit and wisdom and the results of experience and experiment throughout the world in the use of ground limestone.

One copy of this book will be mailed free to all quarry operators who ask for it. Additional copies will be furnished at 25 cents each or $15 per hundred.

Every quarryman will be interested in this book. It is well dressed, its cover pages being attractive—in colors.

New Sales Office Opened

Owing to the constantly increasing demand for Jeffrey products in the Detroit district, The Jeffrey Manufacturing Company, Columbus, Ohio, has opened a new branch office in Detroit in the Book Building on Washington Street between State and Grand Avenues.

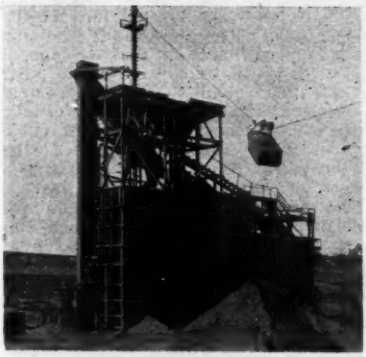
This office will be in charge of Mr. O. B. Wescott, who has had long and successful engineering experience in the sales and engineering-construction departments of our company and is well equipped to render valuable assistance to clients in working out the most economical and practical material-handling equipments for their requirements.

Mr. Wescott will give personal attention to inquiries for Jeffrey portable loading, elevating, conveying, crushing, pulverizing, screening or tipple machinery, and will welcome the opportunity of serving customers in Detroit and vicinity.

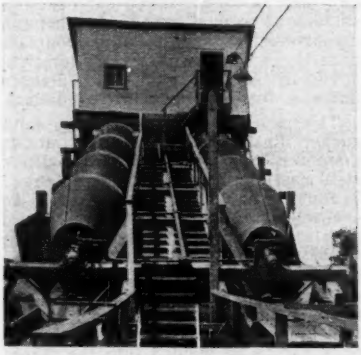
The Gainesville Limestone Co., whose plant two miles from Gainesville, Ga., was recently destroyed by fire, will shortly rebuild the property on a much larger scale than formerly. They are taking care of their customers from their other plant at Whitestone.

LINK-BELT

Sand and Gravel Plants and Accessories



Complete Link-Belt Sand and Gravel Washing Plant



Dull Inclined Conical Screens

WE design, equip and supervise the construction of complete sand and gravel washing plants or alterations to present plants.

The fact that over seventy-five per cent of such plants in America are Link-Belt and Dull designed is proof of the high efficiency and successful operation of our plants.

Our engineers are specialists in this field. Our equipment is of the highest grade and represents positively the last word in design and efficiency.

Write for our Sand and Gravel Plant Book No. 17. Let our engineers help you.

LINK-BELT COMPANY

PHILADELPHIA	CHICAGO	INDIANAPOLIS
New York		299 Broadway
Boston		49 Federal St.
Pittsburgh		1501 Park Bldg.
St. Louis		Central Nat'l Bank Bldg.
Buffalo		947 Ellicott Square
Wilkes-Barre		2d Nat'l Bank Bldg.
Cleveland		429 Rockefeller Bldg.
Detroit		332 Dime Bank Bldg.
Kansas City, Mo.		306 Elmhurst Bldg.
Seattle		576 First Ave., S.
Portland, Ore.		First and Stark Sts.
San Francisco		582 Market St.
Los Angeles		163 N. Los Angeles St.
Toronto, Can.		Canadian Link-Belt Co., Ltd.
Denver	Lindroth, Shubart & Co.	Boston Bldg.
Louisville, Ky.		Frederick Wehle, Starks Bldg.
New Orleans		C. O. Hinz, Hibernia Bank Bldg.

Building Up A Worn Sand Pump

From Engineering Department, Oxweld Acetylene Company, Chicago, Ill., and Newark, N. J.

The type of centrifugal pump used by dredging contractors and mining operators for such purposes as dredging silt, sand, mud and gravel from the bottoms of channels and for mining soft ore by the hydraulic mining system, is subject to excessive wear due to the constant abrasion of the sand and gravel against the inner walls of the pump chamber. When the wear becomes so great as to interfere with the operation of the pump, or "sand sucker," as it is commonly called, it becomes necessary not only to put the pump itself out of commission for repair but also to hold an expensive dredging barge and its crew in idleness.

Such a sand sucker chamber that had become badly scored through use was recently restored to practically its original condition by the Chicago Job Welding Department of the Oxweld Acetylene Co., by means of the oxy-acetylene process. When it is considered that new castings would have cost about $3,500 and that the actual cost of repairing by welding methods amounted to only one-third as much, it is not surprising that the contractor decided to repair instead of to replace, especially in view of the still more important fact that repairing enabled him to get the dredge back into service with only a few days delay, whereas replacement meant a delay of from 10 to 12 weeks.

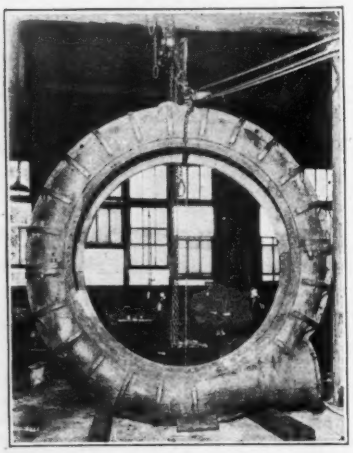


Figure 1—Split Steel Casting of Centrifugal Dredging Pump or "Sand Sucker," 14 feet Outside Diameter.

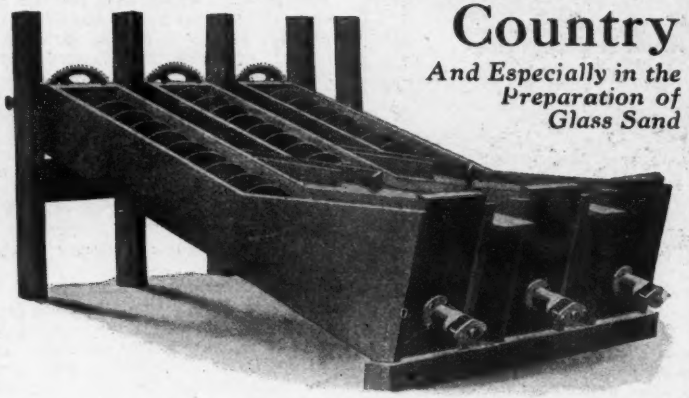
In order to gain some idea of the cost of delay of a hydraulic dredging outfit an estimate of the earnings of a dredge will be given. In the year 1912 the United States Government estimated the cost of hydraulic dredging to be 7.18 cents per cubic yard. This figure represented the average total unit cost of operating a fleet of hydraulic dredging vessels. The record for one month for one dredging pump having a 20-inch outlet pipe was 456,000 cubic yards of material. At the average unit cost given above, the monthly cost of dredging this amount of material represents over $30,000. The sand sucker shown in the illustrations is much larger than the one referred to above. Furthermore, the cost of materials and labor is much greater today than in 1912. When such factors as loss of profits, overhead expenses, non-productive labor and contract penalties are taken into consideration, obviously every week of idleness meant a loss of thousands of dollars.

The pump chamber of the sand sucker illustrated is 14 feet in outside diameter, and consists of two massive steel castings having a total weight of 7 tons. The abrasion had been so severe it was necessary to rebuild both side walls of the pump chamber for a distance of 8 inches from the inner circumference. The thickness of the added metal varied from 1½ to 2½ inches. In addition, a new section approximately 14 by 18 inches in area had to be welded into the throat of the casting. The latter was approximately 3 inches in thickness.

In order to insure holding the two halves of the chamber in alignment during preheating and welding they

Used in Some of the Largest Quarries in the Country

And Especially in the Preparation of Glass Sand



LEWISTOWN
Sand Washers

These are reasonably priced, well built, compact outfits, which can be easily and quickly installed. They are simple in construction and efficient in operation. Extensively used in the manufacture of glass sand which is so much needed today in the making of optical lenses for field glasses, telescopes, etc., required by the Government.

If you are not acquainted with Lewistown equipment and service, it will pay you to look into it.

We are in position to assist you solve your problem of whatever nature, if it pertains to crushing, grinding, screening, washing, drying and conveying, as we manufacture a full line of this machinery and equipment. Drop us a line stating what you desire information on.

Lewistown Fdy. & Machine Co.

LEWISTOWN, PENN.

Figure 2—Building up worn surfaces of Sand Sucker, Depositing 1,264 pounds of High Carbon Steel with aid of Oxweld Oxy-acetylene Blowpipes.

were bolted together and the heavy outer reinforced sections of the castings were not heated, as this would have produced internal strains, either breaking the castings or shearing the bolts that held them together. Preheating by means of charcoal was applied locally for a distance of about 14 inches in from the edges of the flanges, each preheat extending for a distance of 3 feet around the inner circumference.

The total weight of steel added to the castings by welding amounted to 1,264 pounds. The operators, each using an Oxweld blowpipe fitted with No. 15 welding head, worked in pairs. As the heat in the small enclosure where the men worked was intense, it was necessary to hold several welders in reserve and to work on the relay plan, each welding shift extending for a period of 20 minutes. Six days were required to complete the building-up work.

As the built-up surface will be subjected to the same abrasive action of sand and gravel, high carbon steel welding rods were used for the purpose of building up, thereby giving an extremely hard surface, in fact, one that it was impossible to cut with a file, after cooling.

The oxy-acetylene welding work was completed in six days, saving the contractor the expense of several weeks of idleness, nearly $2,500 in cash on the cost of the casting alone, and giving him a pump actually improved in construction, because lined with abrasion-resisting steel.

Rapid Loading with Steam Shovel

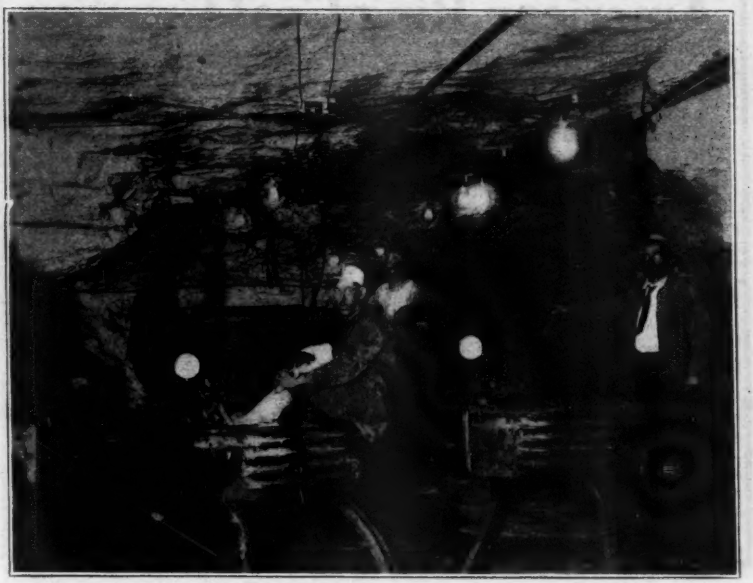
The Marshall Concrete Tile Company, Marshall, Minn., also produce washed sand and gravel for the general market, and for handling this product have a Type "A" Erie steam shovel, equipped with ½-yard dipper, altogether weighing 13 tons. Mr. W. W. Edwards, who is operating the shovel, states that he recently loaded 15 cars of gravel in 10 hours, 8 of these cars being loaded in 5 hours, and that they all received better than 35 yards to the car. This was done in a 10-foot bank and the shovel had to work with boom up and dipper as high as it could be raised in order to clear the cars.

Coyle & Roth recently installed one of their balanced action shaker screens at the plant of the F. C. Kimball Company, St. Paul, which is delivering about 200 yards per day. One motor drives both the shaker screens and a 50 ft. 16 in. conveyor. A test made at this plant shows that machine and conveyor are consuming a current representing about 5 H. P. On the basis of this showing the Kimball concern put in another of these machines; and others have also been sold after an inspection of the Kimball plant.

The Smith Engineering Works, Milwaukee, Wis., have recently issued a bulletin, No. 266, covering equipment for mining, quarry and gravel pit operations. This includes primary breakers, large crushers, rotary screens of all types, washers and quarry hoists. It is a valuable handbook to have on one's desk for ready reference and will be sent to any reader of Pit and Quarry on request.

The New Martinsville Sand Co., Martinsville, West Va., with a capital stock of $80,000 has been incorporated by J. C. McLain and F. L. Bowers of Point Marion, Pa.; J. R. Spease, W. T. Black, C. H. Toothman and C. G. Conway of Fairmont; J. W. Dayton and William Francis of New Martinsville.

The Standard Sand & Gravel Co., of Manchester, N. H., has increased its stock from $10,000 to $50,000.



Two Storage Battery Locomotives at Plant of American Cement Plaster Company, Akron, N. Y.

Storage Battery Locomotives Help to Equalize Power Plant Load

BY CHARLES SPENGLER
Superintendent, American Cement Plaster Company, Akron, N. Y.

The gypsum strata in the Akron-Oakfield district of New York, while of a superior quality, is very thin, only 3½ to 4½ feet thick, and naturally the mining of this is quite a difficult problem.

On account of the thinness of the vein, the workings progress very fast and the haulage from the workings to the shaft or outlet is a large item. After several months' careful study and investigation we decided on a storage battery locomotive on account of its superiority to the trolley type because of no danger from overhead trolley wire, which, in low vein mines, is particularly dangerous; also on account of its being less expensive to install, no overhead wire or bonded rails being necessary, and the generator supplying power would not need to be so large, as the peak loads would not be as great.

We are operating on a peak load electric power contract; and, as most of our crushing and grinding is done during the day, our peaks are highest then and we have plenty of night power available, therefore our power used for charging the batteries is much cheaper than if used during the day when our load is greater and when it would add to our peaks. It also helps to equalize the load on our electric transformers.

Our locomotives are equipped with

American Ring Coal Crusher

Automatic stokers are developing a big demand for stoker sizes of coal, offering new opportunities to business men who enter this field now.

The American Ring Coal Crusher answers all requirements. Made in several sizes, high capacity, low power consumption, correct sizing, satisfactorily handles all foreign matter in coal, occupies minimum space, easy to operate, simple, absolutely reliable.

Wire for Complete Detail

American Pulverizer Co.

We Crush Everything

18th and Austin Streets
St. Louis, Mo.

You can burn cheaper coal

by using SHEAR-KLEAN GRATES

The DIXIE PORTLAND CEMENT COMPANY of Chattanooga, Tenn., wrote us last year when the coal situation was becoming most acute:

"We have found the grates an enormous help in burning inferior coal."

There is a reason for this. The **Shear-Klean Grate** is a scientific combustion machine. Bars work sidewise, giving a crushing action and producing a clean fire bed, clinkers being crushed in formation and forced into the pit with the ash. It is designed on correct mechanical principles—the product of the same class of experts who design your crushing and grinding machinery. Especially efficient where an even, continuous heat is required, as in the lime, gypsum and cement industries, in drying stone before crushing, and the like.

Cut shows grate bar with the roller.

The Shear-Klean Grate Co.

General Office: 808 Monadnock Block Chicago, Ill.

storage batteries, 42 cells, 2.6 volts each, giving us a total voltage of approximately 110. They have high speed motors, with gears to reduce speed, which gives them plenty of power and a track speed of 6 miles per hour.

Our locomotives will each haul 20

Goes Anywhere

cars averaging 4,100 pounds per car, or a draw-bar pull of better than 40 tons. We have a grade of 1¾ per cent a distance of 700 feet and a 3 per cent grade for about 200 feet, the total hauling distance per round trip being 5,000 feet or about a mile. Each machine makes this round trip in about 20 minutes at a consumption of about 2 Amp. hours per car.

The batteries are fully charged in from 8 to 9 hours and are equipped with an automatic charging apparatus. The operator simply puts in circuit breaker, then leaves it and in the morning the batteries are charged, the charging plug automatically cutting out when charge is completed.

The batteries must be kept clean and dry and the cells filled with distilled water, requiring the same care as an ordinary automobile battery.

The storage battery locomotive for a mine of our kind is the only thing in our estimation and we were so well satisfied with the operation of our first one that we immediately ordered a second. These were manufactured by the Mancha Storage Battery Locomotive Company, St. Louis, Mo.

The Shipping Board has ordered a reduction of $2.50 per ton in the rates on cement to the east coast of South America.

Principal Heat Losses

The chief losses in boiler-plant operation are:

Cause—Dirty boiler—loss up to 25 per cent; remedy, clean boiler.
Cause—Leaky setting—loss up to 15 per cent; remedy, tight setting.
Cause—Poor firing—loss up to 40 per cent; remedy, good firing.

A boiler may be dirty on the inside or outside or both. Dirt on the inside is due to scale formation and can be corrected by cleaning the boiler and then giving consideration to the character of the feed water and its proper treatment.

Outside cleaning must receive careful attention. A slight accumulation of soot deposited in a few hours' run will result in a growing loss of efficiency. Some one must be delegated to follow up this matter of soot and see that the cleaning is done thoroughly, frequently, and regularly.

Air leaks reduce efficiency. The ordinary brickwork setting develops cracks and crevices which allow a considerable amount of air to enter the setting, lowering the temperature of the gases of combustion. The porous character of the brick itself is such that an appreciable leakage takes place through the walls.

The remedy is to point up the brickwork with plastic fireproof mixture and paint or cover the setting with a coat of air-tight material.

Bad firing includes allowing holes to develop in fuel bed; carrying an uneven fire; carrying too thin a fire; carrying too thick a fire; stirring fire, thus forming clinkers; and improper manipulation of dampers. It is here that the human equation becomes of most importance. Attention concentrated on what takes place from day to day in front of the boilers will pay greater returns for the time spent than in any other part of the plant.

The Traylor Engineering & Manufacturing Co., of Allentown, Pa., announces the return to their sales organization of Mr. R. R. Shafter who will be located at 30 Church street, New York, where he will hold the position of district manager. Mr. Shafter was for two years general superintendent of the Traylor Shipbuilding Co., and under his management this company completed 3,500 tons more cargo carriers than any similar yard on the Atlantic and Gulf.

For handling sand, gravel, and other solids in suspension at a minimum cost, use

Erie Sand-Gravel Dredging Pumps

Small sizes as well as largest ones are designed to give maximum output and greatest wear for a given weight.

Tell us your conditions, giving total vertical lift with length of pipe line, and ask for Bulletin P-33

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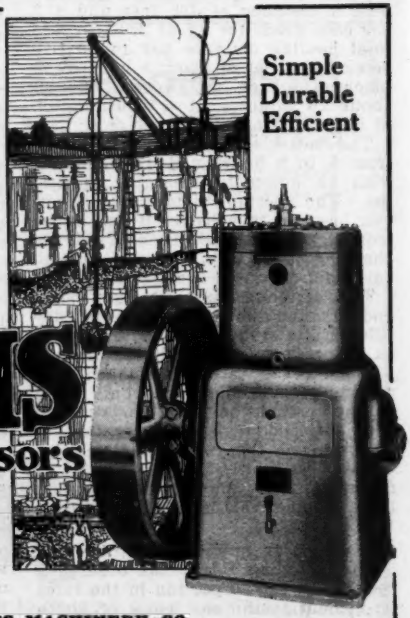
Curtis Air Compressors require less power to operate, because of correct design, good materials used, conscientious construction, and the embodiment of our long experience in manufacturing machinery of this character.



Simple Durable Efficient

CURTIS Air Compressors

Are especially adapted to Pit and Quarry uses. Have self-regulating splash system for cylinder oiling. Can be furnished with automatic unloader if desired. 80% more cooling surface than any double-acting compressors of same capacity. Fully enclosed—dirt and dust proof. Write for illustrated bulletin describing our various models.

CURTIS PNEUMATIC MACHINERY CO.

1628 Kienlen Ave., St. Louis, Mo. Branch Office: 531-K Hudson Terminal, New York City.

Stopping Fuel Waste

Beginning at the grates upon which the fuel bed rests, see that the air spaces are properly proportioned to avoid loss of combustible material into the ash pit. This will depend on the kind of coal used. Study the fuel with this point in mind. Five per cent is not an unusual loss from this cause.

The amount of grate surface is important, as it determines the rate of combustion. Ratios of grate area to boiler heating surface will vary from 1:35 to 1:60, depending on the characteristics of the coal and whether hand fired or stoker fired. For power purposes in hand fired plants do not permit the rate of combustion to fall below 15 pounds of coal per square foot of grate surface per hour, or go above 28 pounds with bituminous coal. With stokers the rate may be as high as the design of plant and the draft will permit. With the fine steam sizes of anthracite the rate of combustion should not be less than 10 pounds.

With settings tight to prevent infiltration of air, heating surface clean, radiation losses reduced by proper covering, piping and steam mains lagged, engine valves tight and properly set, all condensation returned to the feed water heater a good start will have been made in fuel conservation.

However, merely placing the plant in good physical condition will not suffice. Conditions change from day to day, from hour to hour, even from moment to moment. These changes must be interpreted, and the degree of intelligence with which they are interpreted marks the degree of success

A good plant poorly operated will show low efficiency, while a poor plant skilfully operated will sometimes show a relatively high efficiency. Therefore,

Ultimate efficiency=E×H
Where E=Equipment
and H=Human element

Find out what the boilers are doing. Provide facilities for weighing the coal; for measuring the feed water; for checking up on combustion; for determining draft; for taking temperature readings at important points.

In small and moderate sized plants, hand fired, a boiler efficiency of 60 to 70 can be expected, while in medium-sized stoker-fired plants 70 to 75 per cent should be realized. In any given plant determine what efficiency should be expected, considering load and equipment, and keep the plant up to mark set.

Use of Exhaust Steam

A portion of the exhaust should be used for heating the feed water to the highest temperature practicable; not less than 200° in any event.

Exhaust mains should be pitched in the direction of flow, drained and trapped, and the condensation returned to the heater. Use no live steam where the work can be done with exhaust. To get the most efficient transfer of heat the radiating surface of coils and other heating elements should be properly disposed to promote circulation of the heat-absorbing medium, whether air, water, or other liquids. Large increase in efficiency or capacity can sometimes be made in old systems by a little attention to this feature.

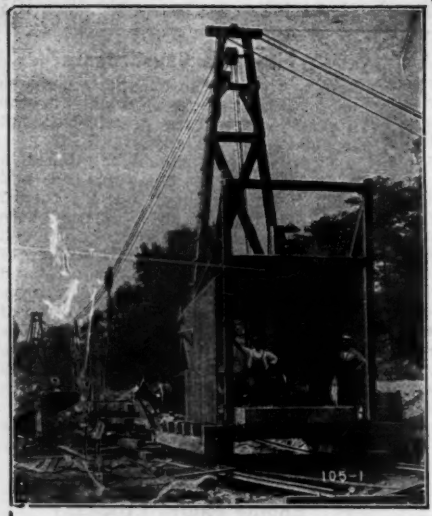
Do not therefore assume that the steam after passing through the engine is a waste product.

Engine Room Economy

After the steam has been delivered to the engine, care should be taken to see that it is utilized to best advantage. Where all the steam is needed, the economy or rate of the engine itself is not of particular consequence; that is, a simple slide-valve engine using steam at the rate of 40 or 50 pounds per horsepower may be the most desirable type to use. This all depends on circumstances. As the demand for exhaust steam decreases, the importance of economy in the engine increases. Should there be periods during which all of the exhaust is not used, the maximum economy of the engine during these periods is of utmost importance. At such times the most economical generating unit should be selected and one of a size that will be economically loaded with the amount of power developed.

Power Plant Records

The importance of keeping a systematic record of operation cannot be overestimated. In this way affairs in the power plant are lifted from the realm of guesswork to certainty. While the system adopted for the ordinary plant may be very simple, the records should be arranged for convenient reference so that comparisons of results with past performance may be made. Thus it is possible to note the effect of changes in equipment or methods and improvements in economy or the reverse may be at once detected.



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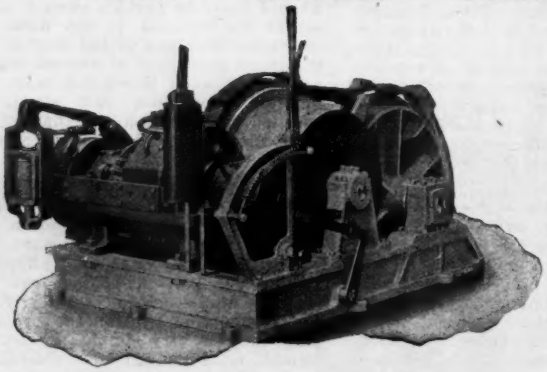

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